British Columbia
Coastal Fisheries Forestry Guidelines

DAY 1

Trainers Manual
Mr. Peter Tschapliniski  
B.C. Ministry of Forests  
Research Branch  
31 Bastion Square  
Victoria, BC  
V8W 3E7

Dear Mr. Tschapliniski:

Your name has been submitted by the BC Coastal Fisheries Forestry Guideline (C.F.F.G.) Training Development Group as a trainer for the recently developed training program. We are pleased to invite you to attend the one-week training session beginning March 29, 1993 at the B.C. Institute of Technology.

The cost of the course will be $450.00, plus $75.00 for an adult learner's course which will be given concurrently with the C.F.F.G. training. You will be provided with a complete training package including access to training handbooks and posters which have been specifically prepared to supplement the training. Attached is a bulletin giving further information in the C.F.F.G. training program.

As a qualified trainer, you will form part of a two or three-person team to train forest workers and technical/professional staff in the two-day C.F.F.G. course. Qualified trainers will be expected to deliver up to six courses during May and June of 1993. The B.C. Forestry Continuing Studies Network (BCFCNSN) will provide organizational support and promote the training throughout coastal British Columbia. The BCFCNSN will be contacting you to confirm your interest in teaching these courses.

All trainers will be reimbursed for course delivery and travel expenses for BCFCNSN scheduled C.F.F.G. one-day and two-day training courses. Furthermore, you may train field operators in the basic one-day C.F.F.G. course and also qualify others as basic trainers.

Qualified trainers who are members of C.O.F.I. may elect to only provide crew level one-day training within their own companies. In this instance no delivery or travel expense is paid.
I encourage you to take advantage of this opportunity to make a significant contribution to integrated forest management in British Columbia.

Please complete the attached registration form and return to BCIT before March 18, 1993 (payment must accompany registration). If payment is made by Visa/Mastercard or company purchase order please Fax the registration form to 432-9572.

If you have any questions, please contact Janice Pontes at 432-8539.

Sincerely,

Sandy McGechaen, Director
School of Engineering
Part-time Studies
The idea: to re-visit a training opportunity

Previous training activity for the Coastal Fisheries Forestry Guidelines (CFFG) was completed in 1988. In conjunction with the pending release of the updated guidelines, BCIT has been working since mid-September with the CFFG Technical Committee toward development of a new training program, with the goal of making this program available in the first quarter of 1993. Phase I of development of the CFFG training package is now complete, and work is underway on Phase 2; namely video and materials production.

This CFFG training program is distinct from its predecessor in that training delivery will span your organizations to reach managers, foremen, engineers, foresters, and most importantly field crews.

The degree of flexibility in the method and timing of training delivery for field crews has been identified as a key concern to the forest industry. The goal in designing the program has been to maintain that flexibility until the last possible moment before the training begins; to enable managers and supervisors to decide who will attend sessions on the morning that they actually start. This flexibility will allow:
- the need to consider weather and other work-limiting factors at the time.
- the need to maintain woods production while training is in progress.
- the desirability of training individuals from a variety of disciplines together in an atmosphere that stimulates shared problem solving.

The focus of training will be centered around two separate days of instruction as follows:

- Day 1 will constitute a core of material designed for delivery to all groups, including field crews from all departments, professional/technical, and managerial employees. Day 1 training will be general in nature, focusing on the themes of fisheries/forestry interaction, as well as the requirements of the various operational phases to achieve compliance with the guidelines. Instruction will utilize a variety of media including video and slides, and will attempt to generate discussion on key points. Day 1 training will take place both at the district and optionally, at the camp level, and will be designed for audiences of up to 30 in size.

The training team for day 1 will ideally consist of one industry trainer and one resource agency trainer.

It is recommended that all field crews undergo the full day 1 training package, and that each session be comprised of members of as many operational departments as possible. However, recognizing that this will not always be practical, the curriculum for day 1 will be structured into modules. Core part I materials will be presented to all participants. Each trainer and client will have the option of selecting and emphasizing modules from part II depending on the audience make-up and the objectives of individual organizations.

- Day 2 instruction will be additional to the material presented in day 1, but will be designed for professional/technical and managerial employees only. It will be assumed that those entering Day 2 instruction have previously completed Day 1 instruction. Day 2 training will be built around a moderated discussion, rather than a lecture emphasis, since many participants will possess a high degree of competence on the subject matter. The focus will be to draw upon the collective expertise of the audience in discussing topic matter. Day 2 training will take place at the district center level, with potential additional sessions at smaller centers (e.g. Kelsey Bay, Sechelt, Sandspit). Audiences of up to 25 will be accommodated per session. Trainers for day 2 will be highly qualified resource specialists.

BCIT’s goal in training development is to provide these programs as soon as possible, utilizing as much input from the target audiences as can be obtained. We welcome your comments and suggestions. Please contact Paul Lawson, Project Manager CFFG Training, at BCIT Industry Services, telephone 432-8539, fax 432-9572.
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**MESSAGE**

Re: CFFG Training at BCIT (29 March)
Dr. Peter J. Tschaplinski,
Fisheries Research Scientist,
Research Branch,
31 Bastion Square, Victoria.
V8W 3E7


Ms. Janice Pontes,
BCIT School of Engineering
Part Time Studies,
3700 Willingdon Ave.,
Burnaby. V5G 3H2

Dear Janice;

Mr. John Lamb of South Coast Division, Canada Department of Fisheries and Oceans, has requested my participation as an instructor in the Coastal Fisheries Forestry Guidelines training program. John has discussed this matter with Mr. Tom Molfenter, and a requirement for my participation as a trainer in the northern region of BC was identified. Accordingly I am sending my Part-Time Studies Registration form to you by FAX today. Given this late date, I shall submit my $525.00 training fee in person on Monday, 29 March. If there is any matter you would like to discuss, please call me at 387-3025.

Thank-you very much for your kind attention.

Sincerely,

[Signature]
PARKING PASSES:
Please pick-up passes at portable NW2.1 from Janice

CLASSROOM LOCATION:
Town Square Building
Rooms A/B
Coastal Forests Forestry Guideline Training Course
BCIT
29 March 1993.

- materials prepared include visuals, slides, & script
- modules will end with question period
- limit questions to keep within schedule

- can illustrate theme with a time line: "Times Have Changed!"

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Forest Practices

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Social Events

- relate to
  - fishing, hunting, etc.
  - recreational events, style of society, what people were thinking.

---

Handbook & Posters will be available for classes.
- main themes of sediment & woody debris will be strongly explained.

Posters: (1) Stream Classification
(2) Sediment
(3) Woody Debris
(4) Streamside

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Summary Discussion:

1. Who makes our streams are classified and marked out?
2. Who makes up logging, roadbuilding, and silvicultural plans?
3. When are the plans discussed & recorded?
4. What if something missing in the plans is found? etc.
(e.g. 6. = Who cleans up during operations)
- SIP slides can be used to lead the discussion – see page 7 of Introduction.
- Discussion period might best be divided up & conducted after all of the 11 modules instead of leaving it to the end of the day.

30 March
Executive Inn, Burnaby

"How Adults Learn" - John Baker

- Team learning
  - Need for larger groups to learn quicker & collectively
  - Fundamental unit is the "team".

- Workshop involves a "Learner-Centered Approach to Training"
  - Most training involves an "instructor-centered" approach to training."
Bill Pollard

Career Path: Originally from Colorado. Worked for Colorado Fish & Game prior to Phoenix. Now with M&G Land Use Planning

Business School - Degree in Economics
MSc in Biology

Major Accomplishments:
- Assisted to maintain a career in ecology
- Revisions of commercial fishing regulations on Lake Winnipeg & Elsewhere. In place - regulations are still in place.

Lessons learned in life:
- "never trust the experts", especially medical doctors.
  - related to his son's illness.
  - should trust own feelings/research.

Training:
- Various experience
  1. Trained all of M&G's 12 logging divisions, other companies & some gov't personnel to inspecting all timber logged since 1988 to determine compliance with the CCFG.
  2. Addressed sustainability classes, other groups.
- 08:10 - entered large, well-lit room.
  - observed about 1200 people in small groups, some having coffee & chatting.
  - felt comfortable about room & wanted to sit down near front.
  - John Baker approached me, introduced himself, shook hands.
  - introduction by John was enthusiastic & friendly.

- 08:30 - after a refreshment we sat down, John opened the session with an introduction of himself, what he does, his company & past experience.

- outlined objectives & theme for the next two days -> team learning

- John demonstrated his retention of the names of all participants.

- we all then broke into teams of 6, learned about each other & then introduced each other in terms to others in room to feel more comfortable.

- impressed with experience of persons in room.

10:30 - heuristic exercise on what major concerns with learning are.

**CRITICAL FIRST HOUR IS THE FOUNDATION OF THE REST OF YOUR TIME.**

- establish foundation of trust
- reduce relationship tension
- atmosphere of trust that permits change & growth.

- adults have great investment in image.
- do not want to lose face in learning.
- overcome this with trust & comfort.
LEARNING AGENDA

TRUST AND CONFIDENCE
- Establish a sense of confidence
- Establish trust with learner
- Sincerity
- Confidence: Instructor, Confidence vs. Dealing with Participants
- Presentation skills

RETENTION AND IMPACT
- Follow up: Ensuring retention
- Overcoming management inertia
- Tools to determine if training is of value
- Achieve common views
- Worthwhile, if audience understands problem & how to solve
- Improve impact of material
- Retain what is relevant

MOTIVATING THE LEARNER
- Define learner's goals
- Keeping group interest
- Motivating the learner
- Is the learning learning?

LEARNED PARTICIPATION
- Develop skills to encourage/raise awareness
- Get participation: Create atmosphere of participation
- Develop interactive skills
- Managing learner participation

READING THE AUDIENCE
- Where to begin
- With audience with varied background
- Learn to adapt

BARRIERS TO LEARNING
- Lack of motivation/interest in topic
- Pre-conceived ideas
- Opening closed minds
- Overcoming personal bias
- People forced to be there
- "It's bullshit"

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TITLE

MODEL
- **CONSUMER of an individual in the audience**
- **PERSON**: does this person fit my stereotype of a person who should be in this role.
  - *guess should fit the image*
- **COMPETENCE**: "do you have the right to be here?"
  - *am I going to learn something from you?*
  - *provide audience with a personal version of background*
  - *meet everyone personally prior to talk*
- **INTELLIGENCE**: "how does this guy intend to treat me?"
  - *issues of safety of personal feelings*

⇒ **ESTABLISH COMMONALITY** with you & others please others with others.
  ⇒ "learning community"

⇒ **MODEL A LEVEL OF PERSONAL SELF-DISCLOSURE**
  - *trainer must take this risk to gain trust*
  ⇒ show a many-sided "you", a multi-faceted "you"
⇒ **PERSONAL AUTHENTICITY**
  ⇒ build greater trust & comfort.
  ⇒ work on this trust throughout the program


- **STRUCTURE INFLUENCES BEHAVIOR**
  - e.g., seating arrangement of room

- establish competence by arriving early, prior to audience.

Adult learning is most effective when it is PERSONALLY relevant.
⇒ personal relevance incorporates professional relevance.
⇒ people learn for their reasons, not ours.
⇒ learning must be problem oriented rather than solution oriented.
⇒ personal learning is most effective when you tap into their experience.
Center responsibility on the learner for their own learning.
Do it in a structured way (e.g., hexagon exercise).

As I reflect on my most successful experiences as a trainer, I remember the improvements in performance of my students as they progressed through the course.

What I like most about being a trainer is generating interest participation in the subject matter.

My favorite instructional techniques is to present visual material in an organized way & talk about them in turn.

What I find most difficult about training is getting completely comfortable about all of the material so that I can summarise it in my presentations that makes it clear, concise, & understandable.

Cognitive Process: Single-loop learning
We may also do double-loop processes.

Key to learning is to close the loop!
Experiencing: Concrete Experience

- Using the experience participants have had already or providing them with new experiences that further learning (e.g., field work).

Processing: Reflective Observation

- Discussing the experience participants have had already or sharing reactions & observations to the activity provided.

Generalizing: Abstract Conceptualization

- Identifying general trends or truths in the experience that participants have had already or forming reactions to new experiences into conclusions, theories, & new concepts.

Applying: Active Experimentations

- Modifying old behaviors, and practicing them in everyday situations.
For limited time & large amt. of material:

→ use inside-out approaches: work on large points first & then move out to successive level of details.

31 March

- Double-loop learning -

\[ \text{[NB. If questions come up in a process & these cannot be resolved, create a "hot sheet" of these issues so that these questions can be universally recognized.]} \]

- can chart a course by plotting interests in optics on an \( x \)-\( y \)-graph. \( \begin{array}{c}
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\[ \text{e.g.,} \]

\[ \text{weight} \]

- single-loop learning is analogous to rearranging the furniture in a room, while double-loop learning is analogous to moving to another room.

- Analyse factors affecting performance.

\[ \text{Window} \rightarrow \text{single-loop learning} \]
\[ \text{Window Frame} \rightarrow \text{double-loop learning} \]

\[ \text{NB: Structure influences behavior.} \]

- People invest great amounts of time in being right.

- General advice:
  - Be honest & fair in all life situations.
- "Being right" often results in repeating the same pattern of thinking → difficult to develop new paths of analysis.
- Windows frames create graphs of reality, but they are not actual reality.
- Windows frames determine what we define as "reality". → "It is what we decide to call it..."

- Beneath reinforcement of thought pathways: build assumptions → make judgements and conclusions → decide influences → add culturally shared beliefs → directly observed data → Selection Process → biases added here.

→ Self-reinforcing loop.

→ How similarities to single-loop learning.

→ Double-loop learning involves changes in entire context.
→ "Shift windows frame."

- Phase of "life": Discovery Phase → Riding the wave → Plateau Phase → "New world loop" → periodic change can be chaotic ("Threshold as a journey") before new formulas for success is clear.

- New formulae for success are often more complicated than earlier ones.

- Often a "stock" process of failure is needed to stimulate the move to double-loop learning (in the discovery phase of the results curve).
- Redecision is sometimes called "remining away".
  
> keep valuable parts of original learning (core values).

Necessary Factors for Double-Loop Learning:

1. Disatisfaction with the current situation
2. Disruption of my context.  
   - personal thought is more effective than that of others.
   - people around the double are also changing, take them as part of solution
3. A glimpse of what's possible.
   - is a personally brave act that is required.
5. A bridge into the new.  
   - baby action steps.  
   - support

- #4 cannot be forced to be sustainable.
  
> fear is only a temporary motivation, i.e. #3 (a glimpse of the future) is important.

Application:

- challenge people's assumptions
- use time-line of historical attitude/ethical change (1950s→1990s).
- are opinions & attitudes reflective of what is real?

Why don't people do what they are supposed to?

1. people don't know what they're supposed to be doing.
   - may not be a training problem.
   - may be due to unclear or mixed goals/expectations.
   - this may be sometimes wrongly addressed as a training problem.
   - must make sure training is clear about the goals.

2. people don't know how to do it.
   - knowledge/skills are involved.  
   - also, practice is needed as is feedback.
   - most training provides these inputs (except, often, practice).

3. people don't want to do it.
   - involves motivation, incentives/reward, & consequences.
   - training is designed to start new behaviors but consequences
sustain it (training will not sustain new behavior).

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- consequences must not favor not doing the new task.
- positive consequences → "what is in it for them?"
- negative consequences → "what is directly bad?"

"PIC" role of motivation with respect to consequences:
- personal consequences > organizational ones
- immediate ones > delayed ones
- certain ones > ones that are a gamble.

④ → something is in the way.
- performance obstacle or an (excessive) organizational barrier.
- behavior is inherent in the structure → affects performance profoundly.

"All organizations are perfectly designed to get the results they get."
→ results will not change until the structure/systems design is changed.
→ 80% of performance problems are structural.

→ today's dinosaur is the pyramidal command & control organization.

- Trainers should look at role in context of before & after training & ultimately examine the product of the efforts in terms of performance.
Application Issues

"Survival skills for the future are not to teach "know how" and "learn how".

peoples' perspectives might be individually different but all are important. Together they can make a good model. There should be no "either us or" perspectives.

shared mental model.

world is formed of interconnected feedback loops.

"in an interconnected world there is no blame..."

1. The Critical First Hour (1/2 hour).

2. Closing the Loop - Balancing content with the process.

3. Participation; connecting people with each other (managing participation);
   - incl. staying on topic.

4. Creating Ownership in the material (ideas, etc.).
   - incl. sustaining interest; framework to be energized yourself; (5) value the relationship, and (6) be on the level and let the chips fall where they may
   
   must move from conceptual thinking to operational thinking.
April.
CFFG Training - BCIT, Burnaby.

Stream Classification - Cornerstone of Guidelines
- must clarify; classification also required elsewhere: assessment, judgement.

1. Risk, Uncertainty & Complexity
2. Turn Problems into Opportunities — real key to integrated resource management.
   - e.g., grass seeding on bare slopes.
3. Who will do it? (Training, Industry)
   - discuss failures as well as successes.
4. Quality vs Production — CFFG is a quality-control tool
   - emphasis has usually been on production at the expense of quality.
5. Chair or Bots? — need more field experience for managers & executives
   - strategy problems — investigate in the field.
   - delegate responsibility.
   - need a system to ensure things get done right.
6. Make a Difference? — blowdown will happen, but success overall will be achieved.

Stream Classification:
- identified on the basis of fish size.

Windthrows:
- should deliver this portion in 45 min — edit given slide package accordingly to tailor the presentation.

Charlie Wilson: "Throw away scripts & use own delivery"
- always remain positive in the presentation & show no agency vs. industry bias.
- don't use training session as a forum to air your personal axe.
- avoid use of jargons
- must be excited about this process. -> bring enthusiasm to the group.
- be involved in the process
- be prepared; make sure everything works & all handouts are present.
  -> know your material. -> DO NOT READ IT.
- be imaginative for delivery.
- objective of program is to provide people with the flavor/content of the
  CFDG -> not to produce CFDG experts in 2 days.

John Lamb.

- we will run another Trainer's Course on 3-7 May.
- registrations/ packages will be sent to all persons.
- tracking/ registration of class lists: full scope of info. costs $6/person.
COASTAL FISHERIES FORESTRY GUIDELINE TRAINING PROGRAM
INSTRUCTIONS FOR TRAINERS

GENERAL

These instructions provide a number of administrative details to assist trainers in organizing and delivering one-day (crew-level) and two-day (basic) courses in the Coastal Fisheries Forestry Guidelines (C.F.F.G.). Trainers must have completed the C.F.F.G. five-day trainers course in order to be fully qualified. Fully qualified trainers are entitled to the following:

1. They may deliver one-day (crew level) or two-day (basic) training courses.

2. They may designate assistant trainers to deliver one-day (crew level) courses. Assistant trainers must have completed the two-day (basic) C.F.F.G. course and be under the general supervision of a fully qualified trainer while delivering one-day courses. Assistant trainers may use the training packages (video, slides, etc.) of their trainer supervisor. Additional training packages may be obtained from the B.C. Institute of Technology (Appendix A Order Form).

3. They will be provided with bulk quantities of participant’s manuals (coloured handbooks and reference material) for pre-distribution to the participants.

4. Only fully qualified trainers can certify class lists from one-day and two-day courses to register lists of trained individuals with the B.C. Forestry Continuing Studies Network (B.C.F.C.S.N.).

The recommended methods for delivery of C.F.F.G. training have been designed to provide the greatest flexibility for delivery, while maintaining sufficient controls to ensure a high standard of instruction. Pilot training sessions have determined that there is sufficient time to deliver the training materials during the training sessions.

It is strongly recommended that trainers utilize the team-teaching concept to deliver one-day and two-day C.F.F.G. courses. Team members should be selected to deliver each course who collectively possess the necessary background in fisheries, forest engineering, and landscape processes. Particular attention should be given to ensure that one team member has the expertise to deliver the windthrow and gully management modules of the two-day course. The B.C.F.C.S.N. can provide names of qualified trainers who have the necessary expertise.
Where possible, one-day training classes should mix professional/management staff and members of field crews to increase the training exchange. Also, government agency and forest industry participants may be included in the same training classes to provide their different perspectives to the learning environment.

Trainers may deliver the one-day and two-day courses using any time schedule which suits the needs of the participants. For example, a one-day course could be delivered in three three-hour sessions to accommodate the shift schedules of a camp. It is recommended that fragmentation of the courses be minimized to ensure continuity of the training. Whatever time schedule is used, the total minimum class time is 7.5 hours for registering one-day course participants and 15 hours for registering two-day course participants. Experience has shown that the maximum number of participants should be twenty-eight participants for each course.

Mandatory content for the one-day course is the introduction and theme presentations of the morning session. Trainers are encouraged to mix operational groups during training sessions and deliver all the operational phases; however, trainers may elect to train only the operational phases during the afternoon which are pertinent to their particular class. For example, a class composed of only falling crews may receive the planning and falling/bucking operational training phases, allowing more time for questions and discussion.

The training is intended to be self-funding; the costs of delivery and training materials will be supported by the course fees of the participants. The course fees are set at $100.00 for the one-day course and $200.00 for the two-day course. These course fees apply to C.F.F.G. training courses that are facilitated through the B.C.F.C.S.N. Companies and agencies may facilitate their own one-day courses and set their own course fee as discussed further in these instructions.

DELIVERY OPTIONS

There are two options for delivery of C.F.F.G. training courses: 1. one-day and two-day courses organized and facilitated by the B.C. Forestry Continuing Studies Network; and, 2. one-day courses organized by trainers (ie: internal forest company courses). Trainers are not encouraged to organize two-day courses until a review is completed of the initial 56 training sessions facilitated by the network.

1. Courses Facilitated by the B.C.F.C.S.N.

These one-day and two-day courses include the 56 training sessions which will be delivered in coastal centres during May and June of 1993. Course fees are set at $100.00 for the one-day course and $200.00 for the two-day course. The B.C.F.C.S.N. is responsible for the following actions concerning these courses:

1. Promotion of the C.F.F.G. training course within the intended area for delivery.
2. Arranging for training facilities including rooms, audio/visual, meals, etc.

3. Arranging for qualified instructors to deliver the training.

4. Collecting registration forms and course fees.

5. Providing class lists and completed certificates of training for the registered participants to the trainers prior to the course. The network will also provide copies of the Coastal Fisheries Forestry Guidelines the two-day basic course as required (note: it is expected that most participants will have their own copy).

6. Receiving completed class attendance and evaluation forms from the trainers and maintaining attendance records.

7. Paying all invoices and costs associated with the course.

Where possible, trainers should distribute participant’s manuals prior to the course.

Any individual or organization may request a C.F.F.G. training course facilitated by the B.C. Forestry Continuing Studies Network to be delivered in their area based on a minimum expected attendance of 18 participants. Courses may be provided to fewer participants at the discretion of the network. Individuals or organizations requesting courses that are facilitated by the network should provide the network with names and addresses of expected participants.

2. Courses Facilitated by Qualified Trainers

These one-day courses will generally be C.F.F.G. courses for forest company personnel that are organized by qualified trainers. Some companies may opt to include qualified government agency trainers as part of the training team. Delivery costs and provision of participant’s manuals (coloured handbooks and reference materials) will be the responsibility of the sponsoring company or organization. There would be no minimum class size or set fees for these courses.

Qualified trainers, or their assistants, would be responsible for the following:

1. Obtaining participants’ names for the course and promotion of the course.

2. Arranging for the members of the training team. (B.C.F.C.S.N. can assist in locating qualified trainers if required).

3. Arranging for training facilities including rooms, audio/visual, meals, etc.

4. Collecting registration forms and course fees if required.
5. Distributing copies of the participants' manual (coloured handbook and reference material) prior to the course. Copies of the participant's manuals may be purchased through the B.C. Continuing Studies Network. Copies of the B.C. Coastal Fisheries Forestry Guidelines must be obtained from Crown Publications, Victoria, B.C. Qualified trainers must ensure that assistant trainers have a training package to deliver the course.

6. A qualified trainer must certify a completed attendance list and ensure that evaluation forms are completed. These documents must be forwarded to the B.C.F.C.S.N. in order to register participants who have completed the training.

7. Paying all invoices and costs associated with the course.

CLASS LISTS AND TRAINING EVALUATIONS

The B.C. Forestry Continuing Studies Network will maintain attendance lists of individuals who have successfully completed the C.F.F.G. training and review training evaluations. The form for recording of class list information is attached as Appendix B. It is suggested that this form be copier-enlarged to 8.5" x 14" to be completed by participants as they arrive for training. A sample training evaluation is attached as Appendix C.

The class attendance information will be used to track the dispersal of C.F.F.G. training and record individuals who have successfully completed C.F.F.G. training sessions. This information will be valuable for building confidence in the forestry industry.

It is the responsibility of the qualified trainer to ensure that class attendance lists and evaluation forms are collected from all participants regardless of the method of delivery. The class lists must be certified by the qualified trainer and sent to: B.C. Forestry Continuing Studies Network, Coastal Delivery Centre, Malaspina College, 900 Fifth Street, Nanaimo, B.C., V9R 5S5 (Attn Tom Molfenter, 741-2597/fax 741-2190)
ORDERING OF TRAINING PACKAGES AND PARTICIPANT’S MANUALS

Qualified trainers may order additional sets of the training packages (videos, slides, etc.) for their assistant trainers by completing the attached order form (Appendix A) and sending it to the B.C. Institute of Technology. Unauthorized copying of the video tapes and slides is not permitted.

The B.C. Forestry Continuing Studies Network will provide bulk supplies of participant’s manuals (reference materials and coloured handbooks) directly to the trainers. Additional copies of the participant’s manuals may be purchased through the B.C. Continuing Studies Network. Trainers will also receive a few poster sets (four posters per set) for display at the training sessions. An initial bulk supply of posters will be provided to each government agency and C.O.F.I. for distribution to their offices.

USE OF C.F.F.G. TRAINING PACKAGES AND TRAINING MATERIALS

There are no restrictions on the use of the training materials (manuals and posters). These materials are intended to assist the training of class participants and promote understanding of the Coastal Fisheries Forestry Guidelines.

The training packages (videos, slides, etc.) are designed for the exclusive use of the qualified trainers and assistant trainers as training aids to the C.F.F.G. training course. Unauthorized copying of the video tapes and slides is not permitted. The training packages may be used as training aids in other courses or presentations, however it should be clearly stated to the participants that the presentation does not constitute a recognized course in the Coastal Fisheries Forestry Guidelines.

CANCELLATION OF TRAINING PRIVILEGES

The C.F.F.G. Technical Committee and the B.C. Forestry Continuing Studies Network will provide any reasonable assistance to qualified trainers to enable trainers to conduct effective training courses. The technical committee is available to clarify any technical issues which may arise during training.

The technical committee reserves the right to cancel the training privileges of trainers who demonstrate an inability to deliver the C.F.F.G. training in a clear and informed manner. Any trainer who has his/her training privilege cancelled may receive a reimbursement for the cost of their training course (less $75.00 for the adult learners course) upon return of their complete training package. Trainers may not receive a trainer’s course reimbursement by refusing or returning the training packages at their discretion.
APPENDIX A  
Coastal Fisheries Forestry Guidelines  
ORDER FORM FOR TRAINER PACKAGES

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**TRAINING PACKAGE ITEMS**

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<tr>
<td>a. Trainer Manuals (set) @ ($50.00)</td>
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<td>b. Video VHS Tapes (set) @ ($40.00)</td>
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<td>c. Slides (9 carousels) @ ($700.00)</td>
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<td>d. Case Study Maps (set of 8) @ ($160.00)</td>
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<td>e. Carrying Case @ ($35.00)</td>
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TOTAL

Above prices in effect until September 30, 1993.

**METHOD OF PAYMENT**

- [ ] Company Purchase Order  
  P.O. #
- [ ] Cheque/Money Order (Enclosed)  
  (make cheque payable to B.C.I.T.)
- [ ] Visa
- [ ] MasterCard

Card No.:

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Expiry Date: [ ] [ ]

Signature: ______________________

**NOTE:** Copies of the B.C. Coastal Fisheries Forestry Guidelines must be obtained from Crown Publications, Victoria, BC.

**SEND COMPLETED ORDER FORM TO:** B.C.I.T.  
Janice Pontes  
Engineering Industry Services  
Portable N.W. 2.1  
3700 Willingdon Avenue  
Burnaby, BC V5G 3H2
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**ONE-DAY AND TWO-DAY COURSE DATE / LOCATION:**

**COASTAL FORESTERS FORESTED GUIDELINE TRAINING**

**CLASS ATTENDANCE REGISTRATION**
APPENDIX C

COURSE EVALUATION FORMS

(to be provided by B.C. Continuing Studies Network)

Forward To: B.C. Forestry Continuing Studies Network, Coastal Delivery Centre
Malaspina College, 900 Fifth Street, Nanaimo, B.C., V9R 5S5
(Attn: Tom Molfenter, 741-2597/fax 741-2190)
Day 1: Monday March 29

"Day 1" CFFG Training
Facilitators:
Paul Lawson – BCIT
Peter Bruce – BCIT
Robert Laird – BCIT
- see day 1 outline for detailed agenda

Day 2 & 3: Tuesday/Wednesday March 30-31

"Learning How Adults Learn"
Facilitator:
John Baker

Day 4: Thursday April 1

1. Welcome and Introduction from the CFFG Technical Committee
Facilitator: John Lamb, Chairman Training Subcommittee, CFFG.
- details TBA

2. "Day 2" CFFG Training Part I, II & III
Facilitators:
Paul Lawson - BCIT
Peter Bruce – BCIT
Terry Rollerson – MoF Forest Sciences
- see day 2 outline for detailed agenda

Day 5: Friday April 2

1. "Day 2" CFFG Training Part IV and V
Facilitators:
Paul Lawson – BCIT
Peter Bruce – BCIT
Dan Hogan – UBC Fisheries Research
- see day 2 outline for detailed agenda

2. CFFG Training Delivery and Implementation
Facilitator:
Tom Molfenter - BC Forestry Continuing Studies Network
- details TBA
Agenda for Day 1 Training - BC CFFG

Part I - Welcome and Introduction
- Who are these guys?
- Where do they come from?
- What are we going to do?
- When’s lunch?
- When do I get out of here?

1. Introduction
   - video
   - slides
   - participation/discussion

Coffee

Part II – Theme Presentations - each consisting of:
- Introductory Video (3-5 min)
- Slide presentation (5-10 min)
- Discussion (10 min)

2) Fish and their habitat requirements
   20 min
3) Sediment
   15 min
   Coffee

4) Woody Debris
   15 min

5) Streamside areas
   20 min

6) Streamflow and water quality
   20 min

Lunch

Part III - The CFFG and Operational Phases
   each consisting of:
   - Introductory video (3-5 min)
   - slide show (10-15 min)

7. Planning
   25 min
8. Road Construction
   25 min
9. Falling
   - Coffee
   15 min

10. Yarding and Loading
    25 min

11. Silviculture
    25 min

Part IV - Workshop Summary Discussion

1 hour
Agenda for Day 2 Training - BC CFFG

Part I - Introduction
1. Welcome and Introductory Statements
   Start: 8:30
   Duration: 15 min

Part II - Topic Discussions
2. Stream Reach Classification
   - What is it?
   - What do you need to know to do it?
   - How do you do it?
   - What are the main areas of difficulty?
   Start: 8:45
   Duration: 30 min

3. Windthrow
   - Windthrow mechanics
   - Risk/hazard assessment
   - Strategies for managing windthrow
   Start: 9:15
   Duration: 45 min

Coffee
Start: 10:00
Duration: 15 min

4. Gully Management
   - Critical factors determining debris transport capability
   - Recognition of gully risk/hazard factors
   - Decision making tools
   Start: 10:15
   Duration: 45 min

Part III - Case Study I
5. Planning exercise
   - critique of a cutting permit level logging plan using detailed
   - resource assessment provided at the executive summary level.
   - groups composed of multi-disciplinary teams
   Start: 11:00
   Duration: 60 min

Lunch
Start: 12:00
Duration: 60 min

Part IV - Topic Discussions II
6. Streamside Management
   - The nature and size of SMZ's
   - Requirements to implement SMZ's
   - Planning considerations
   - Operational considerations
   Start: 1:00
   Duration: 45 min

7. Roads and Planning
   - Difficult guideline concepts
   - Road de-activation - Hazard/risk assessment
   - Key Success Factors - Constraints to quality
   Start: 1:45
   Duration: 45 min

Coffee
Start: 2:30
Duration: 15 min

Part V - Case Study II
8. Communication exercise
   - design and delivery of a tailgate session for logging crews building
     on the planning exercise developed earlier.
   Start: 2:45
   Duration: 60 min

9. Wrap Up Discussion
   Start: 3:45
   Duration: 20 min
EXECUTIVE INN BURNABY

The Executive Inn - Burnaby is located just 10 kilometers (6 miles) from downtown Vancouver. It is centrally located amongst Burnaby's major industries and is easily accessible to both business and leisure travellers. Set in the midst of the business district the Executive Inn is in close proximity to the well known Pacific Coliseum, as well as minutes from Canada's second largest mall "Metrotown Center". Many landscape rights include: Simon Fraser University, the Burnaby Village Museum, unforgettable skiing and golf, as well as the tranquil surroundings of mountains and Deer Lake Park.

OTHER LOCATIONS

EXECUTIVE INN RICHMOND

7211 Westminster Highway
Richmond, B.C. V6X 1T5
For Reservations Call: (604) 278-5555
Toll Free: 1-800-663-2878
Fax: (604) 278-5555

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V.P. OTHER THINGS

TOP DOG

UNDER-DOG

KEEPER OF THE KEYS

HEAD OF DEPT. HEADS

MYSTERIOUS V.I.P.

EXPERT 1

EXPERT 2

EXPERT 3

HONCHO

EXPERT 4

EXPERT 5

EXPERT 6

FLAVOR OF THE MONTH EXPERTS

GOOF OFF

FOREMAN'S RIGHT HAND

REAL WORK

FOREMAN'S BIG TOE
Materials Checklist for Day 1 Training

☐ 1 - CFFG Training video
☐ 7 - slide carousels #1 - #7
☐ 1 - handbook for each participant
☐ 4 - sets of posters per session
☐ 1 - day 1 trainers manual

☐ slide projector and screen
☐ TV / VCR with at least 26" screen
☐ Pointer
☐ Darkened room with seating for 28
☐ Reading light (optional)
INTRODUCTION TO CFFG TRAINING PROGRAM

FISH AND THEIR HABITAT REQUIREMENTS

SEDIMENT

WOODY DEBRIS

STREAMSIDE AREAS

STREAMFLOW AND WATER QUALITY

PLANNING

ROAD CONSTRUCTION

FALLING AND BUCKING

YARDING AND LOADING

Over
The day 1 portion of the CFFG training program has been developed as a vehicle to reach all forest workers with the basic concepts required to plan and work near the fisheries resource. It was designed to be delivered to a broad variety of workers simultaneously in a variety of environments. It was also designed as flexibly as possible, recognizing the problems and constraints that will be encountered in delivering this training across the B.C. Coast.

It has been the experience of the developers of this training that the majority of problems that occur working around streams are a result of breakdowns of successive links of the decision making chain.

For example; many roads wash out, delivering large amounts of sediment into fish habitat, not only because have they been improperly designed and built, but also because they have had their drainage structures plugged by debris during the falling, yarding, and loading phases, and also because no ethic of cleanup has been developed.

Where no dialogue occurs between all of these phases, there is no stated responsibility for who will do what and when. In short, we have found that the problems occur not only within but also between phases of operation.

This training program has been designed to address some of these observations. Because all workers must develop an appreciation of each other's role in the process, it is highly recommended that all receive the entire day 1 training program.

Recognizing that this will not always be possible, the material has been structured into two parts: an introduction and five theme presentations which comprise a core of required material, and four operational phase modules for each of planning and road construction, falling and bucking, yarding and loading, as well as silviculture.
A partial endorsement will be granted for each worker who receives the entire core material as well as one of the phase modules. However, in order to receive full endorsement for the training, a worker must undergo the entire day 1 program.

It will be the responsibility of the trainers for each session to record and submit the names of all those attending the session on the proper forms, and to designate whether they receive partial or full endorsement. As well, additional information will be collected from each participant, in order to supply statistical information on the audience, as well as to maintain a database of endorsed workers.

While the design of the training makes it possible for delivery to be extended over a period of more than one day for each audience, it is recommended that each session be given continuously, and during working hours. We realize that this recommendation somewhat limits the flexibility of managers and supervisors in scheduling crews through the training, however many of the modules build on material presented previously. There is also a designed-in reiterative message about the consequences of poor practices, the need for good practices, and the need for teamwork. In order to be effective, it is our opinion that this message must be given uninterrupted, during a complete one day session.

It is expected that the desirability of having a multi-phase audience consisting of engineers, fallers, road builders, yarding and loading crews, and foresters and silviculture workers will also give managers maximum flexibility as to who will attend each session, while also allowing firms to maintain at least partial operations concurrent with the training.
ABOUT THE DAY 1 TRAINING

The Outline

Day 1 training has been structured around 11 different modules as follows:

1. Introduction

Themes:

2. Fish and their habitat requirements
3. Sediment
4. Debris
5. Streamside areas
6. Streamflow and water quality

Operational Phases:

7. Planning
8. Road Construction
9. Falling and Bucking
10. Yarding and Loading
11. Silviculture

Each of these modules consists of a short introductory video, a slide presentation, and a question/discussion period. The approximate length of each varies and is summarized for each module.
The Videos

Video is an effective tool for providing messages within moving images. The videos produced for the day 1 training have been designed to fulfill a number of different objectives:

- to provide these moving images in real footage to illustrate the key ideas of the module
- to provide a preview to the upcoming slide show and discussion
- to provide each trainer with an equally effective introduction to the module
- to give life to difficult concepts and consequences using animation
- to make the topic material as entertaining and lively as possible

The videos were designed to be used as part of the training, and are not intended to be a stand alone product. A disclaimer at the beginning of the program clearly identifies this fact. Merely watching the videos does not qualify a trainee for even partial endorsement for day 1 training.

The videos are arranged on one VHS tape in order of presentation. For each video, a summary of content is as follows:

1. *The introductory video* is a brief glimpse at the entire day 1 package. It asks the key questions which will be answered in the appropriate module throughout the day. Unlike the other video segments, the introductory video’s content does not relate directly to the material discussed in the introductory slide show. Rather it provides a general introduction and layout for the entire day 1 package.

2. *The fish and their habitat video* is a general primer on fish biology designed to give the layperson an understanding of the key concepts of fish and fish habitat management.

3. The sediment, debris, streamside ...
3. *The sediment, debris, streamside areas, and streamflow and water quality videos* are structured around the key concepts of these very important theme core modules.

4. The operational phase videos are proceeded by a *brief introductory segment*. It introduces the six key questions which will later form the basis for the final workshop discussion. It is very important that this segment be shown in advance of any exposure to the operational phase modules. If for example, only fallers are being trained for partial endorsement, and are only receiving the falling and bucking module, they must be shown this brief introductory segment prior to viewing the falling and bucking segment. It is not necessary to discuss this segment until after the appropriate phase segment has been shown. For trainees receiving full endorsement, the video can be left to run into the planning phase segment which follows, without pause for discussion.

5. Each *operational phase segment* (planning, road construction, falling, yarding, and silviculture) contains a preview to the key success factors which form the basis for discussion during the slide show. The videos use only one example of each key success factor for illustration. The slide shows provide further examples of each factor.

**About the Key Success Factors**

Throughout the development of this training, and during the audits process that proceeded it, the complexity and subjectivity of the CFFG were a source of constant concern to the course developers. It also became apparent that it was not an objective of this training to teach forest workers how to build roads; fall trees, lay out settings, yard and load logs, or plant trees. What can be accomplished however, is to make workers aware of what they must do **while they do their jobs** which will enable them to work in a manner which protects fish and fish habitat.
In this sense the CFFG represent the desired results of what can be accomplished. Much like the menu in a restaurant, they list the final product of a lot of background teamwork, planning, and information. To carry the analogy a step further, this would include; the chef’s recipes, the health regulations, safety rules, and the ability of the kitchen staff to work as a unit.

While the key success factors are not in the guidelines, they are an important part of each workers ability to apply the guidelines, and to work in an effective manner around streams and fish habitat.

The Slide shows

The majority of this manual contains a basic script of the slide show for each module. The slide shows are provided in sequential labelled 80 slide carousel trays. The entire slide package is also provided as a VHS format narrated video tape. It is recommended that this tape be used only as an emergency backup in case of slide projector failure or unavailability. This recommendation is based on the following desired outcomes:

- slides provide a larger, higher quality image for the trainees.

- the personal narrative of the trainer will be superior to that of the tape in conveying key messages and emphasizing important points.

- a personal narrative can be adapted to suit the audience or the location and provides better opportunities for discussion and questions during the presentation.

If the slide video is needed as an emergency backup, it is recommended that the trainers narrate the slide show using this manual. The video can be paused if needed for discussion or emphasis. Neither full or partial endorsement will be granted for viewing of the slide show video alone. Participation and discussion are key elements of the day 1 training.

The Workshop Summary Discussion ...
The Workshop Summary Discussion

The six questions raised during the operational phase introductory video segment will be used as the basis of the summary discussion. These questions are provided as slides at the end of the phase slide shows and are as follows:

1. Who makes sure streams are classified and marked out?
2. Who makes up logging, roadbuilding, and silviculture plans?
3. When are these plans revised and discussed?
4. What if something is missed?
5. What if we find that we can't do what the plan says?
6. Who cleans up during operations?

It is recommended that each of these questions be addressed in order as a group moderated discussion. It is suggested that trainers take the opportunity to discuss beforehand the exact format for this discussion with the local management of the sponsoring agency or operator. Some possible formats for this discussion could include:

- the engineering department making a short presentation on their stream classification and fish sampling activities
  - the logging manager leading a discussion on delegation of clean-up responsibilities among departments.
  - the divisional engineer spelling out protocols for reporting of unmarked channels and unforseen problems.
  - a brief description of the local planning process by resource agency and operations personnel.

It is recognized that it is beyond the mandate of this training program to provide the answers to these questions. However their importance must be understood at all levels. It will be the objective of this portion of the day to provide a forum for the participants to find their own answers.
Wherever possible, this session should give opportunity for local and divisional issues to be integrated into the discussion. Activities such as divisional environmental practices committees and other relevant issues can be important to answering these questions.

The trainers role in this discussion should be more as a facilitator than as an instructor. Providing observations and advice on how other organizations answer the questions is also recommended.

Version 1.0 93-02
INTRODUCTION TO CFFG TRAINING PROGRAM

FISH FORESTRY GUIDELINES TRAINING PROGRAM

INTRODUCTION TO CFFG TRAINING PROGRAM

1. PEOPLE, FISH AND FORESTS

A brief history of fisheries/forestry interaction:

- forest development in the last century was based on a frontier mentality: clearing land for homes, agriculture, firewood. In other words, we were conquering and developing the wilderness.

- this frontier mentality is changing. The main emphasis is no longer on timber extraction. Instead, there is more concern about other resources.

Originally, fisheries management and forestry management were based on an adversarial relationship:

- in any bargaining situation, the end result that one side gained something and the other side lost something.

- it was a win-lose situation that relied on conflict management and conflict resolution.

During the period of 1960 to 1980, it was discovered that adversarial management does not work. This point was brought to light in the late 1970s when certain events caused everyone to realize that conflict management was not in everyone’s best interest.

Out of this came the realization ...
Out of this came the realization that there is a need for cooperative management:

- the need for a different standard in which there are two winners, not one winner and one loser.

...... READ FROM SLIDE

It is important to recognize that fish and forest co-exist:

- adversarial management was based on the incorrect belief that the resources do not rely or depend on one another

- instead, the fact is that fish require fresh water habitats that are present in the coastal forest; the trees, of course, are dependent on the soils and water produced in the coastal watershed.
2. WHAT ARE THE CFFG?

The British Columbia Coastal Fisheries/Forestry Guidelines present a set of minimum standards for the protection of fish habitat, recognizing the co-existence of fisheries and forestry.

1. The elements of the guidelines are:

   1) stream reach classification — a system for describing stream reaches based on their use by fish

Class A streams are:
.....READ FROM SLIDE
- these are often larger valley bottom streams of major drainages ...
- but can be as small as this ...

Class B streams are:
.....READ FROM SLIDE
- an example of a typical Class B

Class C streams are:
.....READ FROM SLIDE
It is important to know that Class C streams are small ...
..... or large

2. Operational guidelines:
.....READ FROM SLIDE

3. Finally, the appendices, which are additions to the guidelines, include a glossary and other background information supporting the implementation and use of the guidelines. They are:
.....READ FROM SLIDE
3. WHAT'S BEHIND THE CFFG?

The decision to draw up and implement the British Columbia Coastal Fisheries/Forestry Guidelines was influenced by two factors:

- the perceived need to change from an adversarial relationship to a co-operative relationship
- research, including Carnation Creek and FFIP

Carnation Creek is a watershed on the west coast of Vancouver Island. It was established in the early 1970s as a fish/forestry research outdoor laboratory.

A number of different logging practices and treatments were studied here. A lot of the information that came out of this research is the basis of our knowledge today of fisheries/forestry interaction.

The Fisheries/Forestry Interaction Program — commonly known as FFIP — began in the late 1970s. It is similar to the Carnation Creek project, although it isn't based in a specific area. Instead, this program studies different areas all around the Queen Charlotte Islands. It largely focuses on landslides, including looking into the frequency of landslides and whether or not logging is related to increases in that frequency. It also studies the effects of landslides on fish habitats.

Both FFIP and Carnation Creek are continuing their research at the present time.

The CFFG first came out in 1987. They were developed from public, industry and agency input and were based on FFIP and Carnation Creek research. They are now a contractual part of forest tenures.

The CFFG have already been revised and further development and revision are still ongoing.

There are numerous benefits...
There are numerous benefits from applying the guidelines:

- clear water
- fish as an indicator of a healthy environment
- benefits to tourism
- benefits to fisheries
- better angling opportunities

All of these activities are part of integrated resource management. The central theme of integrated resource management is that our resources are contributing to a whole, and that each resource can benefit from proper management ... taking place at the same time.

The fish/forest interface is only one segment of integrated resource management. The land use cycle is dependent on all resources being properly managed. And making the decision to harvest or not harvest is based on the job we do and how well we do it.
4. WHAT'S BEHIND THE CFFG TRAINING?

- to ensure that practices achieve the objectives of the CFFG
  .....LINK TO SLIDE.....

- to establish a method of reaching the goals
  .....LINK TO SLIDE.....

The participants today will benefit from this training in a number of ways:

- there is every indication that in the future all forest workers will be required to have basic training in environmental practices. Taking today's program will help you to fulfill some of the potential requirements now under consideration.

- potential for more job satisfaction because you will know that your work is not adversely affecting the environment.

- there are time and cost savings associated with having a trained workforce that is capable of self-supervision

- better fishing and recreational opportunities

The need for this training was highlighted by the recent audits concerning CFFG compliance. The findings of the audit were:

- debris management needs improvement

- road deactivation needs improvement

- streamside management needs improvement
  (LINK THIS CONCEPT TO SLIDE)

Sediment, debris and streamside management are key themes of fisheries/forestry interaction.
Everyone involved recognizes the necessity to continue dialogue between industry and agencies while maintaining a co-operative relationship. No one wants to revert to the confrontational relationship of the past.

Another important reason for this training: At this time, the Forest Practices Code is being developed, and some of the Coastal Fisheries/Forestry Guidelines are being considered for inclusion into this Code.

SUGGESTED TIME TO PAUSE FOR QUESTIONS.

IF NO RESPONSE, PERHAPS CAN ENCOURAGE COMMENTS WITH:

Is there anyone here who thinks that we can really afford to go back?
5. **WHAT WILL COMPLIANCE COST?**

Many of you are probably wondering what this will cost... It's becoming apparent that compliance with the guidelines will result in money being spent more wisely than it is now. A point to remember: Crisis Management is Expensive... You all know it is costly to go back and correct mistakes.

The key focus of the guidelines is identifying problems early in the planning process, rather than trying to fix them after the fact. Early identification of problems allows you to either avoid them or come up with strategies to properly deal with them ahead of time. Either option should result in cost savings.

Some current costly practices/situations:

- flying in agencies for field reviews when not necessary
- delays in approvals
- logging deferred in sensitive areas — because we don't have credibility, and our poor relationships don't allow us to get approvals
- negative public reaction to poor performance; as well, a lot of money has been spent on trying to counteract the perception of poor performance
- lost business in foreign markets due to poor reputation

6. WHO IMPLEMENTS THE CFFG?...
6. WHO IMPLEMENTS THE CFFG?

Who implements the CFFG? Well, the answer is that everyone does.

Everyone in the circle of operations has a role to play. Implementing the guidelines relies on each person taking responsibility. This is a team effort.

.....LINK TO SLIDE.....
7. WHAT ARE THE OPTIONS?

Fish are the canaries of the mine. Fish are seen as the indicators of the health of the environment. And if the fisheries resource can't be sustained during the course of our timber harvesting, then there is a good chance we will not be allowed to continue.

The fisheries resource can be impacted by a major event, but it's more commonly effected by a number of small ones in a variety of locations. The majority of these forest impacts are known as cumulative effects ... and they add up over a period of time to have a large impact on the resource.

I'm sure you've all seen example of fish streams that have been abused in the past but have recovered. We know this does happen. But not all the time. There are also streams that have been abused ... and left permanently unproductive. No one benefits. It is not in our best interest to accelerate the natural processes that cause erosion and landslides.

In this case, this Class C stream looks like it had been abused......

...... but we can clean it out, as you see in this slide .....  

We can also plan for a better integration of fisheries concerns and forest harvesting in the Planning phase, as is shown in this slide .....  

I'm showing you these slides so that you can appreciate that with careful planning, mistakes can be avoided and corrected.

Currently, Washington and Oregon are faced with cut reductions of up to 95 per cent due to deferrals for non-timber values. We could easily be facing the same reductions or more unless we act together.

DISCUSSION: Can you suggest any other options?
FISH AND THEIR HABITAT REQUIREMENTS

Video # 2

FISH AND THEIR HABITAT REQUIREMENTS

TEXT

FISH AND THEIR HABITAT REQUIREMENTS

1. WHY IS A KNOWLEDGE OF FISH IMPORTANT TO FOREST INDUSTRY PERSONNEL?

The introduction has shown why a knowledge of fish is important to industry operators ... A knowledge of fish and their habitats will help you to understand stream classifications and apply the guidelines in the right locations.

Salmon — such as the pink salmon we see here — as well as trout and Dolly Varden, are collectively known as salmonids and are produced in coastal drainages.

As with logging, the fishing industry has long been of major importance on the Coast, as shown in this 1904 picture of gillnetting off Steveston ...

.... and here the fishermen are unloading their catch after a gruelling day's work.

Recreational fisheries are also a major resource of coastal drainages

.... and even loggers are known to enjoy wetting a line occasionally.

VISUALS

2 - 1 Title graphic

2 - 2 "Why is a knowledge...

2 - 3 Guidelines

2 - 4 Pink Salmon

2 - 5 Gillnetting off Steveston

2 - 6 Unloading Catch

2 - 7 Man fishing
2. WHAT SALMONIDS ARE PRODUCED
IN COASTAL DRAINAGES

Salmonids fall into two basic categories:
- anadromous or migratory fish
- resident fish

Anadromous fish include the five species of salmon, and the sea-run varieties of cutthroat, rainbow (or steelhead) and Dolly Varden. These fish are hatched and reared in streams and lakes, migrate to the ocean as smolts or juveniles, and return to spawn in fresh water. They are found in Class A waters.

More than 10 million salmon spawn every year in more than 2,500 nursery streams along the B.C. Coast. It is estimated that over 200 streams on Vancouver Island could support maximum returns of 30,000 winter and 7,000 summer run steelhead. Current returns of spawners are only about a half of these numbers.

Resident fish, which include rainbow trout, cutthroat trout and Dolly Varden, spend their entire lives in fresh water streams and lakes. They are found in Class B waters.

Examples of anadromous fish include:
- sockeye
- steelhead

Examples of resident fish include:
- cutthroat
- Dolly Varden

Streams with resident sports populations are CLASS A. Streams with resident non-sports populations, or non-sports species are CLASS B. Resident non-sports populations are fish too small to be fished recreationally.

Lakes with sports fish of any size and tributaries that are used by these fish for spawning and rearing, are also CLASS A waters. Lakes with non-sports species, such as sticklebacks, are CLASS B.

3. WHAT IS THE LIFE CYCLE...
3. WHAT IS THE LIFE CYCLE OF A SALMON?

There is a wide variation between species and areas in the timing and preferred habitat for fish spawning and rearing.

Often, two or more species will utilize the same stream simultaneously. It is important to establish site-use patterns for each individual watershed in order to be sure that your harvest planning decisions are specific.

To make an effective plan, a knowledge of what fish use occurs in the watershed is required.

A general life cycle of a salmon includes:

- adults return to the streams of their birth to spawn usually between mid-summer and early winter. Timing varies between species and location of the stream on the coast.

- eggs are laid in a hole in the streambed excavated by the female.

- the eggs are fertilized by the male and then quickly buried. The adults then die.

- eggs incubate in the gravel during winter and hatch in the spring as alevins with their yolk sac still attached.

- once this sac is absorbed, the young fish emerge from the gravel as fry and move into their rearing habitats.

- chum fry — as seen here — and pink fry swim downstream to the estuary almost immediately after emerging.

- the other species have a longer period of fresh water rearing, which for the Coho can be up to two years. Consequently they require both Summer & Winter rearing habitat. Prior to migration to the ocean, fry develop a silvery coloration and are known as smolts.

- sea-run trout — ...
- sea-run trout — such as this steelhead fry — and Dolly Varden usually spend several years in streams before migrating to the ocean. They may return to spawn more than once.

- the length of this ocean life varies between species, but involves extensive migrations into the North Pacific Ocean before the fish return to spawn.

- an important fact to note is the number of life phases in freshwater that can be impacted by harvesting activities
4. WHAT ARE THE FRESH WATER HABITAT REQUIREMENTS OF SALMONIDS?

Just as people have environmental requirements such as food and clean air and water, fish have similar needs within their aquatic environment.

In general, fish require:

- good water quality, which includes clean oxygenated water
- clean gravels in which to spawn (even seasonally flowing streams can be utilized. And in many areas, ground water sources are utilized for spawning areas).

Rearing requirements change as fish grow. Summer rearing habitat is different from winter rearing habitat. The basic needs of the fry are food, cover and shelter to escape predators and storm flows.

Coho fry utilize areas with large woody debris, such as logs and root wads, which provide complex cover for them during the winter.

- after emergence from the gravel, fry often move to shallow areas along the stream margins and then move into deeper pools later in the summer
- stable flows without extreme scouring are required to provide a moist environment for eggs during their development
- here, these small channels provide overwintering areas outside the main channel. These areas may be dry in the summer and distant from the spawning areas.
- Coho fry in particular are known to move from the main channel during the first fall storms into small ponds, sheltered backwaters and small tributaries, such as this channel photographed in the summer.

- holding areas are sites ...
holding areas are sites where adults finish maturing prior to spawning. These areas, which are especially important to steelhead, are characterized by cool temperatures and shelter from predators. They are often found in canyons.
5. ARE SMALL CHANNELS LESS IMPORTANT THAN LARGE CHANNELS?

No. Stream size is not a good indicator of fish use or stream class

... This is a CLASS A stream ....

but so is this .......

Some CLASS A streams may only carry water during the winter season and are dry during the summer.

While CLASS B streams are typically small steeper-gradient reaches, they can also be large low-gradient streams above barriers and inaccessible to migrating fish. They could also be upgraded to a CLASS A through enhancement.
6. CONSEQUENCES OF POOR HARVESTING PRACTICES ON THE LIFE CYCLE AND HABITATS OF FISH

Historically, logging occurred with little regard to its effect on fish, as shown by the storage of shake bolts in the Pitt River in 1923.

It is important to realize that despite their adaptation to variable environmental conditions, salmonids are highly sensitive to stream conditions during spawning, hatching and growth of the young.

Logging can have an impact on:

- spawning migration — by blocking access to spawning grounds. However, it should be noted that many jams are passable and also provide rearing cover.

Logging can have an impact on:

- emergence of fry — by sedimentation of spawning gravels smothering the eggs and trapping the alevins.

- Roads, yarding disturbances ....

- poor gully management and poor streamside practices are the main sources of sediment.

Logging can have an impact on:

- fry rearing — by disrupting wintering habitat. For example, road construction across flood plains can block access into off-channel habitats.

- Increased bedload from bank erosion and sedimentation can lead to dewatering, leaving the channel dry in the summer and reducing rearing habitat.
Logging can result in:

- break up and loss of woody debris in streamside areas, reducing the ability of these areas to supply food, cover and shelter for fry

Logging can also have an impact on:

- migration of smolts where logging streamside cover results in even small temperature changes. This can affect the timing of egg development, the emergence of fry and smolt runs.

Logging can have an impact on:

- rearing in estuary areas — through log dumping and booming activities

Timing of operations such as bridge building is generally restricted during the summer between fry emergence and spawning. The timing depends on species and location. In the north coast, adults may return earlier than those on the south coast. Knowledge of local conditions is critical in identifying periods of operation.

Resident fish, such as this cutthroat trout, are vulnerable to the effects of poor logging practices in each phase of their life cycle. Therefore, many regard these fish as prime indicators of the relative health of streams and watersheds, even though they may be too small to be fished recreationally.

Disturbances to fish habitats occur from small point sources such as side cast failures, but as the development of the watershed continues, these numerous small sources can result in a cumulative effect. This in turn can have a major impact on fish production in that watershed.

In summary, the consequences of harvesting impacts can lead to:

..... READ FROM SLIDE

| 2 - 47 Logged channel |
| 2 - 48 No streamside cover |
| 2 - 49 Estuary |
| 2 - 50 Bridge construction |
| 2 - 51 Resident trout |
| 2 - 52 Side cast failure |
| 2 - 53 Cumulative effect |
| 2 - 54 Potential impacts |
7. BENEFITS OF IMPROVED LOGGING

There are many potential causes of fish mortality, of which fresh water conditions are only one. Others include:

...... READ FROM SLIDE

In general, more productive spawning and rearing habitats produce more smolts in a healthy condition. Larger and healthier smolts — such as this pink salmon — are better able to withstand the other mortality factors.

The more effective that we are in protecting fresh water habitats through the application of the guidelines, then the better are the chances of ensuring that returning adults continue to maintain healthy fish populations in our forested watersheds.

Effectively protecting fish habitat requires:

- identifying fish use in the watershed
- evaluating sensitive areas
- evaluating potential downstream impacts within the watershed
- and applying effective operational techniques to address specific problems.
SEDIMENT

1. WHAT IS SEDIMENT?

In this segment, we will examine sediment in a little more detail as well as discuss sediment control. Sediment control is a key theme of the guidelines.

This slide shows a cloud of suspended sediment moving down a ditchline. For many of you, the word sediment will be associated with this particular size range, which is called suspended sediment. However, sediment is a more inclusive term. It also includes the coarser materials that make up the stream's channel and its bedload.

In the next few slides you can see that as this coarser material moves in various rates of flow, it actually makes up the stream channel .... here we have high-flow conditions. You can't see the larger materials moving, but you will usually hear them ...

- this gravel bar has been moved during higher flow conditions. By the way, note the effect caused by the woody debris — which we will be talking about in the next segment .......

- the channel itself is made up of the coarser materials which change over time. This picture shows another gravel bar in medium flow conditions.

Water and sediment are very important in shaping the landscape. Of course, water, sediment, erosion and deposition are four elements we have to strongly link.

TIME: 5:28 Minutes

VISUALS

3 - 1 Title
3 - 2 "What is sediment?"
3 - 3 Suspended sediment
3 - 4 Higher flow conditions
3 - 5 Gravel bar moved in higher flow conditions
3 - 6 Gravel bar in medium flow conditions

This slide shows the Fraser River...
This slide shows the Fraser River and a side tributary filled with silt. You see the normal state of suspended sediment transport. You can also see coarser materials being delivered by the side tributary. And you can see clear water is coming in at the side. It's these clear tributaries, by the way, that help salmon migrate up such silt-laden rivers as the Fraser. These clear tributaries provide resting places for fish to overcome some of the effects of suspended sediment.

Sediment is part of the natural process. It's not something that we can speak of as being bad in itself. Sediment is not good and sediment is not bad — sediment is A FACT OF LIFE.

In this slide you see a massive sediment source along the river system constantly feeding fresh gravels and sands into it ....

Sources of sediment, as you can see, include:

- channel sides (including everything from the estuary to the gully head wall, as we see in this slide)

- hillslopes adjacent to channel sides. This slide shows a small landslide contributing sediment directly into a channel.

There are other natural ways that sediment gets into channels. This slide is of a snow avalanche, which you can see is transporting quite a few fines to the main channel.

The next few slides deal with the process of sediment storage and movement. This slide shows the strong link between sediment and woody debris.

.....LINK TO SLIDE.....

Sediments move naturally through a stream system from hillslopes and from landslides. The channel itself is made of sediments.
Sediment is also stored without the link to debris. Channel systems are extremely dynamic. In this slide you can see large levees of sediment in a system that has had a debris torrent.

This slide shows a Class A stream reach with large amounts of sediment storage — braided channels with sediment transport and deposition. This leads us to the very important idea that every stream system has a sediment budget.

Another way to look at this: water and sediment are in a continual process of movement together.
2. WHEN IS SEDIMENT A PROBLEM?

You might ask: If sediment is so much a part of nature, then why is it a problem in terms of forest management? Once again, sediment itself is not the problem. However, when the amount of sediment is above natural range or above the stream’s ability to transport it, then there is cause for concern.

Where do these increased amounts come in forestry activities? They come from:

- cut slopes and road surfaces, as you see in this slide....
- or eroding road surfaces as you see here ...
- eroding ditchlines ......
- and forestry-related landslides and destabilized streamsides, as you also see in this slide

The consequence of putting more sediment into streams is that the nature of the channel environment changes, including:

- the water becomes dirtier
- the channel becomes overloaded with bedload, as you see in this slide ...

.... and in extreme cases of overloading, channels can get dewatered and severely destabilized.

Extra sediment in water and channels causes a number of problems for fish:

.....READ FROM SLIDE.....

3. HOW DO WE CONTROL SEDIMENT? ....
3. HOW DO WE CONTROL SEDIMENT?

There are three strategies or techniques for controlling sediment production. These are simply erosion-control strategies:

LET'S LOOK AT EACH ONE IN TURN . . .

.....READ FROM SLIDE

1. Avoid creating landslides. For example, don't build roads in situations like this. Note the heliblock in the upper part of the picture.

   - this slide shows a steep, wet section that will need special handling to avoid road failure.

This subject is covered in the Land Management Handbook Number 18.

.....READ TITLE .....  

   - leave streambanks intact by using leavestrips to avoid the situation you can see in the next slide ..... This subject will be dealt with in the segment on Streamside Management.

2. Keep sediment where it is by covering exposed soil with vegetation. This slide shows a grass seeded cutslope and ditch, which dramatically reduces sediment production ....

   .... This slide shows well armoured stream crossings and grass seeded roadsides.

3. Capture sediment before it causes a problem. Here you can see a sediment basin ......

   .... And here is a silt fence. This is a fabric to capture sediment until vegetation is established.

We have talked about how sediment is linked to woody debris. In nature, it is woody debris and sediment that create channel form. In the next segment, we will be looking at woody debris in more depth.
WOODY DEBRIS

VIDEO

WOODY DEBRIS

TEXT

WOODY DEBRIS

1. WHAT IS DEBRIS?

Woody debris is simply everything from branches to whole trees.

We have already talked about the connection between sediment and debris. As with sediment, debris is part of the natural dynamics of all systems in the forest environment. Debris is part of the channels, fish habitat, sediment storage and flow control. And debris is neither good nor bad. In this slide, you can see a natural debris accumulation in a northern river. This is prime fish habitat. Note the many small channels.

..... this is a closer view of a natural debris jam

Our understanding of debris is far from complete .... Many of you will remember that even 15 years ago we used to blow those debris jams out of the water ... due to a misunderstanding of debris and the process of channels. Debris was seen solely as an obstruction to fish.

We have found that in most cases debris is not an obstruction. However, when amounts exceed or fall below the natural range, then debris can cause problems.

..... even small debris in channels contributes to channel control. The small branches you see in this picture are holding back bedload and creating a small pool.

VISUALS

4 - 1 Title graphic
4 - 2 "What is debris"
4 - 3 Natural debris in river
4 - 4 Natural debris jam
4 - 5 Branches and Pool

TIME: 3:42 Minutes
Typically, we would think of the larger debris — which is called **Large Woody Debris** or **LOD** — as being most important in sediment storage. As you can see in this slide, the gravel disposition is influenced by the large tree which has fallen into the stream.

Size and orientation of the debris influence and channel shapes, pools and riffles

Here you can see how the effect of a single tree in a river creates pools.

Because of the dynamics of streamflow, organic debris in streams influences the channel only at particularly high flows

In this slide, this large log elevated above stream will only affect the channel during much higher flows than you see here.

.....the gravel bar in the foreground of this slide is a result of the log spanning the stream. At this flow condition it is not affecting storage of gravels.

.....some naturally active channels have very active debris inputs. With both debris and sediment, we use nature as the reference point for what is too much or too little.

4 - 6 Gravel storage

4 - 7 Tree in pool

4 - 8 Elevated large woody debris

4 - 9 Gravel bar - large woody debris

4 - 10 Active channel

2. WHEN IS DEBRIS A PROBLEM? ...
2. WHEN IS DEBRIS A PROBLEM?

Logging can change the balance of debris and sediment by introducing additional debris into gullies or channels, which may remain for years. This slide shows a gully system where the debris loading is excessive and unstable.

This slide shows what can happen when the debris moves all at once.

.....debris can also damage drainage systems. This wood culvert is not likely to survive.

4 - 11 "When is debris a problem"

4 - 12 Debris in gully

4 - 13 Torrented channel

4 - 14 Wood culvert

3. HOW DO WE CONTROL DEBRIS? ...
3. HOW DO WE CONTROL DEBRIS?

There are three basic strategies for controlling debris:

.....READ FROM SLIDE

The first strategy is keeping debris out. We will look at this further during the segment on Falling and Yarding. Debris is difficult to remove once it is in a creek. Keeping it out is the best option we have.

In this slide, we can see how easily this debris has moved. At the planning stage, assessing the potential debris inputs and debris transport capability is essential.

Transported debris can pile up and cause channel changes, as you see in this slide ....

.....and again in this slide, where deposition has occurred above the debris pile

The second strategy is removing debris if it gets in .... This is a real problem -- Debris management plan should avoid or prevent this.

Clean-up of mobile debris is essential.

The next two slides show a debris-cleaning operation that involved both machine cleaning and hand cleaning on a CLASS C stream.

Remember that mobile debris may be created after falling and yarding operations. Relogging or shake cutting, as you see in this slide, can undo good clean out. Management of debris may not be complete after primary logging. We should be checking debris stability for at least a few years after logging.

Here, the gully system has been cleared by machine. Gully sides have been re-vegetated with grasses and legumes. In this gully, a hoe was used to clean out a heavy debris accumulation.

4-15 "How do we control debris"

4 - 16 Three strategies

4 - 17 Falling

4 - 18 Channel with small debris

4 - 19 Small debris pile

4 - 20 Deposition of sediment

4 - 21 Men in gully

4 - 22 Uncleaned stream

4 - 23 Cleaned stream

4 - 24 Shake cutting

4 - 25 Re-vegetated gully

*If debris transport is likely ...*
If debris transport is likely and debris clean-out is difficult (or unreliable), then some kind of leavestrip may be necessary, even on a Class C stream.

The third strategy, capturing debris before it becomes a problem, is shown in this slide. Using debris traps or grizzlies requires planning and careful maintenance. This strategy is a last resort.

This is a picture of UNSTABLE landing debris on a hillside directly above a creek. Wherever it is, debris management should be a concern of everyone who works in the woods.
# STREAMSIDE AREAS

**Video # 5**

**STREAMSIDE AREAS**

**TEXT**

1. **WHY ARE STREAMSIDE AREAS IMPORTANT TO STREAMS AND FISH?**

   In brief, streamside areas are important because:
   
   ....READ FROM SLIDE

   To an engineer's eye, an average productive stream with large pieces of wood in the channel, jams and side channels, probably looks a mess. The fact is, research studies have shown that fish require this large material in the channel for habitat. Without large wood, the channel would soon resemble a ditch, efficient for transporting water, but very poor for producing fish.

   In very general terms, the more complex the debris in the channel is, the more fish it will hold. For example, a root mass, or undercut banks, provides cover to many more fish than does a single piece of smooth log. Logging stream banks can result in the loss of undercut banks, which are also valuable fish habitat.

   For these reasons, there is a greater emphasis in the BCCFFC on managing streamsides to provide these benefits by leaving more trees. Also, this is why there is virtually no cleanout of logs in lower gradient channels, and why debris removal in steeper channels is highly selective.

**VISUALS**

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<thead>
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<tbody>
<tr>
<td>5 - 1</td>
<td>Streamside areas</td>
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<td>&quot;Why are...&quot;</td>
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<td>5 - 3</td>
<td>Streamside areas provide...</td>
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<td>5 - 4</td>
<td>Channel with LOD</td>
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<td>5 - 5</td>
<td>Scoured channel</td>
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<td>5 - 6</td>
<td>Undercut bank</td>
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<td>5 - 7</td>
<td>Logged bank - eroded</td>
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<tr>
<td>5 - 8</td>
<td>Low gradient channel with wood</td>
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<td>5 - 9</td>
<td>Debris jam in gully</td>
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2. **WHAT OTHER RESOURCES ...**
2. WHAT OTHER RESOURCES DEPEND ON STREAMSIDE AREAS?

In addition to fish, Streamside areas are important to resources such as:

- Wildlife
- Recreation and,
- Biodiversity in watersheds

Because they provide benefits to a number of resources, streamside areas are key areas of concern in the preparation of Integrated Resource Plans.
3. WHAT ARE THE CONSEQUENCES OF REMOVING STREAMSIDE VEGETATION?

Some of the main consequences of harvesting streamside areas are:

.....READ FROM SLIDE

This is an example of an impacted channel following harvesting.

The impact to stream channels from improper management can persist into the next rotation.
4. WHAT ARE STREAMSIDE MANAGEMENT ZONES OR SMZ’S?

To provide a perpetual and sustainable supply of large woody material, as well as leaf and needle litter and smaller materials, the BC-CFFG include a management unit known as a Streamside Management Zone, or SMZ, to protect streamside areas.

In the past, the amount of vegetation left in streamside areas has been highly variable. Protective measures usually prescribed leaving only deciduous, immature conifers and occasional leaners. This buffer consists of a narrow band of alder.

Research over the last decade has shown the major role that large woody material has in maintaining the channel and providing fish habitat. It is clear that the volume of large material we have left in streamside areas in the past was inadequate.

Consequently, the SMZ described in the revised BC-CFFG reflects the current management concerns for protecting streamside areas. The SMZ concept is one of the most significant improvements over the first edition of the Guidelines.

Where will the SMZ be applied?

.....READ FROM SLIDE

The main features of a SMZ on Class A streams include:

- The SMZ is a minimum of 10m wide
- Where stream channels are between 10 and 30m wide, the SMZ is equal to the channel width.
- Where channels are wider than 30m, the SMZ is a minimum 30m wide, on each bank.

- The SMZ is measured from the edge...
- The SMZ is measured from the edge of the streambank of the outermost channel. This point is usually the transition from silt or gravel streambed to a streambank. Where it is poorly defined, a change in the character of the vegetation can be used.

From an operational point of view,

.....READ FROM SLIDE

This slide illustrates these points.

Because of their value to wildlife and their potential as instream debris, snags should be retained where it is safe to do so. The WCB and the resource agencies have developed a wildlife/danger tree assessment process for training workers to make these decisions.

5 - 27 "Can harvesting ..."

5 - 28 "SMZ closeup"

5 - 29 Snag
5. WHO IS INVOLVED IN PLANNING, LAYING OUT, AND CREATING AN SMZ?

If a SMZ is required, but you're not sure that it can't be done without damage to the stream, then the block probably shouldn't be logged the way it is laid out.

Logging around these areas successfully calls on the skills of the all the people involved, and the use of the right kind of machinery.

People from engineering, roads, falling, yarding and loading and often silviculture are involved, and it is one of best examples, when applied correctly, of teamwork in the woods.

The most common process for developing a SMZ along a Class A stream is described as follows.

**Engineers**

- collect fish use and stream class information, either themselves or with consultants or agency people.
- the streamside area is examined and all water courses, including temporary or seasonal drainages are identified.
- The proposed treatment is shown on a harvest plan, (which we will assume has been approved.)
- Road and landing locations are finalized. Road construction details, where construction will be required, is put onto maps for the equipment operators. The falling boundaries may be examined with the Fisheries Agencies.
- the appropriate width of the SMZ is clearly flagged out; the information including prescriptions for falling and yarding, is put on setting maps and given to those departments.

5 - 30 "Who is involved ..."

5 - 31 Poor streamside management

5 - 32 Good SMZ

5 - 33 Engineer Fry Trapping

5 - 34 Seasonal changes

5 - 35 Opening Map

5 - 36 Agency field trip

5 - 37 Engineer flagging SMZ

Falers - The boundary is walked with...
Faller

- The boundary is walked with the engineers and often with fisheries agency people.

- In the majority of cases, the opening adjoining the proposed SMZ will be laid out to fall and yard away from the SMZ.

- The fallers expertise and experience help to determine which trees can be safely felled away from the boundary, which are retained, how to deal with problem areas such as snags, and often help in making adjustments to the Falling Boundary.

- Trees within the SMZ that may be directionally felled out without damage to the SMZ are marked. The number and sizes of trees felled out is site specific and is a joint decision made with all the people involved.

- One of the most important skills is the ability to directionally fall trees out of the edge of a SMZ. This is often dependant on having the right equipment such as jacks or a line horse.

Yarding

- The care taken in yarding logs out of the edge of a SMZ is just as important as the care taken in directionally falling. Ensure that the location of yarding equipment and chokers will result in the logs being yarded directly out of the SMZ without damage to residual trees.

- This phase is where most opportunities for innovation occur. Non-conventional harvesting by Helicopter or Balloon are often ideal for very sensitive areas but are not economic in all locations, and it is the skills of the operators using more conventional equipment that can determine whether or not the SMZ is a success.

- The use of several machines...
- The use of several machines, such as a hoe chucking wood into deflection for a loader is often successful, as is the use of tong lines on hoes to yard in from wetter ground where you wouldn’t want to put the machine. Super snorkels are often a valuable machine for this type of yarding

.....LINK TO SLIDE

- The use of backspar cats along the falling boundary calls for specific care in trail construction and rehabilitation.

.....LINK TO SLIDE

- At the beginning, we mentioned that in most cases, wood will be felled and yarded away from the SMZ. Where the deflection and equipment ensures complete suspension of logs, yarding over the SMZ may be a permitted option if is can be ensured that the SMZ will not be damaged.

- Developing a logging plan without considering debris management or only paying lip-service to it, should not be considered a good practice.

- Cross stream yarding would generally only be an option on Class B and C streams. Doing it right requires you to clean up any logging debris. Stream cleaning of logging debris is expensive and time consuming, whether by hand or by machine, and is usually an example of where a mistake has been made, or a logging plan has failed. Here we see a well cleaned channel (Class B). Note the retention of stable debris.

Silviculture

- Infill planting may be required where selective logging has occurred in the SMZ.

- There may be a need for some brush control, and in special cases, snags may need to be created.

5 - 44 Loader on Road

5 - 45 Backspar trail

5 - 46 Radio controlled carriage

5 - 47 Gully cleaning

5 - 48 Cleaned channel

5 - 49 Brushing
- Rehabilitation of backspar trails, landings and other areas may be required.

- Remove slash from brushing and spacing above HW.
6. WHAT ARE THE MAIN CONSIDERATIONS INVOLVED IN LEAVING A SMZ.

This is a SMZ that has been left along a Class A stream.

The prescribed width has been left on the right hand side of the channel.

The opening on the left side of the channel was logged about 10 years ago and only a single stand of alder was left along the channel.

A tributary used by salmon was included in the SMZ.

The treatment along the falling boundary shows directional falling of selected trees out of the buffer for yarding with a snorkel. Great care was required in both falling and yarding out of the buffer to avoid damage to the residual trees.

With selective removal, the edge of the buffer has been thinned, and a range of different size trees has been left. Falling boundaries don't have to be straight lines. Where possible, immature conifers along the edge of the zone have been retained, and where safe to do so, snags were left.

In gully channels, where slope stability would be adversely effected by logging and where channel stability requires the input of large woody debris, SMZ's are also left.

..... LINK TO SLIDE

- this applies to Class B and as shown here, to Class C streams.

Streamside trees are may be left at the toe of steep slopes adjacent to Class B and C streams to prevent logging debris from entering the channel. The widths of these buffers is varied to suit site conditions.
7. WILL IT ALL BLOW DOWN?

Windthrow is one of nature's ways of putting wood into stream channels. It is also one of the major problems in designing SMZ's, and a factor that can haunt the layout engineer.

One objective of the SMZ is to provide the contribution of material into the channel over time. Windthrow can result in a lot of material entering the channel in a short period of time. Now what do you do?

Management of windthrow is addressed in detail in day 2, but a few considerations follow.

Can you predict the likelihood of windthrow? A number of site indicators of windthrow are:

..... READ FROM SLIDE

How can you reduce the risk?

..... READ FROM SLIDE

Plans for managing windthrow are not always successful. What do you do if windthrow occurs in the SMZ? In most cases it should probably be left. Salvage of windthrow could result in even more site disturbance. Also in many cases, windthrow need not continue further into the stand once the exposed edge has been thinned by blowdown.

Remember that research studies have stressed the importance of large woody debris in the channel. In general, the current management approach is that:

- although windthrow can result in more material entering a channel in a shorter period of time than originally planned, the long term benefits of having the wood in the channel probably overcomes the shorter term impacts resulting from bank and channel disturbance.

- where channel disturbance would have major impacts, options such as selective removal may be considered following site examinations.

5 - 56 "Blowdown"
5 - 57 Natural blowdown
5 - 58 Heavy blowdown in gully
5 - 59 "Site indicators..."
5 - 60 "Managing ..."
5 - 61 Windthrow into CK
5 - 62 Blowdown disturbing bank

8. WHAT ARE FISHERIES SENSITIVE ...
8. WHAT ARE FISHERIES SENSITIVE ZONES OR FSZ'S?

FSZ's are areas that are important to fish, but which may not be readily identified as fish habitat. Fish use may be limited to a short period of time but their habitat value requires that they be protected.

These areas include:

- small ponds, swamps, or small channels that may only be seasonally connected to the main channels.
- side channels that are only seasonally active
- floodprone areas

FSZ's at these sites are often extensions of SMZ's along main channels.

The importance of small and seasonal channels to fish is frequently greater than their size implies. These areas may have little or no water velocity, and stream channel stability is often not as dependant on large woody debris as in larger channels. Often smaller trees will meet the instream needs. The main management concern is to avoid disturbance to these channels and to maintain their connection to the main channel for fish access in and out.

FSZ's can include small narrow channels such as this. Directional falling and yarding away may be required to maintain channel stability, but in some cases trees may be felled across, leaving the spanning piece of log, or lifting it without damaging the channel.

Ponds are relatively straight forward to deal with by flagging out an appropriate buffer and falling and yarding away.

More of a problem may be found in wide, floodprone areas where yarding disturbance could create major problems by changing drainage patterns, and producing sediment and small moveable debris. These areas may require that no trees be harvested within the area.

Identifying FSZ areas is often difficult...
Identifying FSZ areas is often difficult because they may only be seasonally active. Engineers, fallers and the yarding crew should be aware that sites that are dry during the summer, may provide fish habitat during wet conditions. Ensure that there is a means of reporting back and adjusting plans accordingly in these circumstances rather than carrying on and hoping for the best. In many cases, harvesting activities will be restricted to dry periods, keeping in mind the timing of fish use.

SMZ’s and FSZ’s are viewed as the best means of protecting fish habitats today while addressing future needs. Because these areas provide the requirements of other resource concerns, they will be a key part of integrated resource management.
STREAMFLOW AND WATER QUALITY

1. WHAT RANGE OF STREAMFLOW OCCURS IN COASTAL DRAINAGES?

This slide show the Capilano River on December 13, 1990, at normal winter flow. There is a clearance of five metres. Flow is less than 100 cubic feet per second.

This second slide shows flow on November 23, 1990 at the same location. Clearance is one metre, and flow is approximately 20,000 cubic feet per second. The difference in flow is over 200 times. We see this kind of fluctuation in stream flow in the majority of our coastal rivers.

Some coastal drainages are dominated by snow or glacier melt and can have high flows during the summer heat period, June and July. This slide shows a coastal drainage where permanent ice fields and glaciers contribute to stream flow.

In most coastal drainages, the high flows are a result of winter rainstorms that generally occur November through February. The high flows you see here are typical of this period.

High flows are times when channels can change dramatically. This slide shows scouring which has removed gravel around a cedar that has been there for more than 150 years.

On the coast, rain on snow usually causes the highest peak flows. Warm fronts bringing rain and higher temperatures melt snow that is on the ground or in trees. This snow melt adds additional water to the already high flows.

As you see here, low flows ...
As you see here, low flows generally occur in late summer. We can also get low flows during the wintertime, in prolonged sub-zero temperatures. The water gets stored as snow.
2. WHAT ARE THE EFFECTS OF FOREST HARVESTING ON STREAMFLOW?

Forest harvesting can alter streamflow if large percentages of a watershed are cut in a short period of time, as you see in this picture.

Trees intercept rain and snow and also use water in evaporation and transpiration. In this slide, notice that where there aren’t any trees, the snow is on the ground.

More snow usually accumulates in clearcuts than under the forest.

Carnation Creek research indicates that unless more than 40 per cent of a drainage is clearcut in a short period of time, harvesting alone is not likely to increase streamflow. In the 1990s, emphasis on integrated resource management, sustained yield management and biodiversity will likely make it impossible for more than 30 per cent of a drainage to be cut in that short time period. Only in situations of pest damage or fire would such high rates of cut occur. Whenever plans call for more than 30 per cent of the drainage to be cut, specialists in hydrology must be consulted.

The Watershed Workbook addresses the implications of forest harvesting streamflow. It also addresses the issue of cumulative effects. Because it is a complex issue, the workbook provides a systematic procedure for field staff to identify when to call in specialists.

The quality of harvesting and road practices is usually more important than the actual area that is harvested. In this watershed, the consequences of poor quality operations are clear. The cumulative effects shown here include:

- damage to stream banks
- road failures
- disruption of natural drainage patterns

Note: - the gullied terrain ...
Note:

- the gullied terrain
- the use of slash burning on steep slopes
- deterioration and the widening of channel and increase in bedload

These are the very things that using the B.C. Coastal Fisheries Forestry Guidelines will help us avoid.

What a difference you see here .... with a balanced harvesting plan, long-term planning, leavestrips and good road practices, we can reverse the cumulative impacts .... in this drainage, note the continuous leavestrip

The cumulative benefits arising from these careful operations will be examined more closely in the sections dealing with Operational phases.

3. WHAT ARE THE EFFECTS OF ...
3. WHAT ARE THE EFFECTS OF FOREST HARVESTING ON WATER QUALITY

The muddy water you see here is an aspect of water quality that we discussed in the Sediment section.

Forest harvesting can also affect water quality in other ways such as reducing dissolved oxygen.

- this is a field kit for measuring dissolved oxygen

Oxygen in the water can be reduced through increased stream temperatures (cold water holds more oxygen).

This slide shows leachates from a log sort and dump. Wood leachates and fine organics from dry land sorts, landings and log dumps consume oxygen and are toxic.

This type of impoundment and release of water from road construction can also be harmful to fish.

Other water-quality issues include:

- chemicals of all sorts
- oils
- wood preservatives
- some road binders

If dumped in the water, these materials can be toxic.

Water quality does not need to be adversely affected by forest management. The objective of good management practises is - to control sediment AND KEEP WATER QUALITY AND QUANTITY WITHIN ITS NATURAL RANGE.
PLANNING

Video # 7

PLANNING

Text

In previous segments, we discussed cumulative effects and how small events add up to large impacts. But also remember your actions can have cumulative benefits: small things, when done properly — and added together — can create significant cumulative benefits in terms of reducing impacts on fish habitats and maintaining sediment and debris transport at natural levels.

In addition to teaching you about the guidelines, I will be giving you background information for each operational phase in the context of key success factors, which will help you to apply the guidelines.

KEY SUCCESS FACTORS ARE:

If the guidelines are like items on the menu at a restaurant, then the key success factors are the recipes for applying those guidelines; they are the essential ingredients needed to achieve the guideline objectives. All of them must be considered together in order to apply the guidelines successfully. They became apparent as a result of numerous audits where poor performance was traced to one or more of these factors not being recognized where good performance was found where all factors existed.

The guidelines give specific treatment to the planning phase on pages 7 - 21. The planning element is considered as part of each phase within the guidelines, but for this discussion we will deal with it separately.

Visuals

7 - 1 Title graphic
7 - 2 Cumulative benefits

7 - 3 Guideline pages

1. INFORMATION GATHERING
1. INFORMATION GATHERING

Information gathering may be the key factor in your ability to implement the B.C. CFFG in the Planning stage. Without proper information, you simply can't deal with all the other factors that we will be discussing later on in this section.

The three most important pieces of information include:

- knowing where the streams are
- being aware of the presence of fish in those streams
- knowing the characteristics of those streams

To apply the guidelines, you must have this information.

It is also essential to know:

- slope stability
- windthrow potential
- engineering characteristics of soil materials

To apply the guidelines, these are also crucial.

7 - 4 "Info gathering"
7 - 5 Engineer working
7 - 6 Engineer and Stream map
7 - 7 Engineer and Class B stream
7 - 8 Unstable slope
7 - 9 Blowdown
7 - 10 Engineer looking at muddy road
2. **ANTICIPATING PROBLEMS**

As you anticipate problems, it is necessary to be as specific as possible. Here are some examples:

- anticipating stream channel changes
- anticipating sediment production from a road
- anticipating which roads will be difficult to deactivate
- anticipating compaction and erosion problems from yarding disturbance
- anticipating debris transport capabilities of gullies and streams
- anticipating windthrow sensitivity

- 7 - 11 "Anticipating prob."
- 7 - 12 Guy looking at problems
- 7 - 13 Channel changing at high flow
- 7 - 14 Eroded cutbank
- 7 - 15 Road const. on steep terrain
- 7 - 16 Extreme yarding disturbance setting
- 7 - 17 Gully with natural debris
3. GENERATING AND EVALUATING OPTIONS FOR ROADBUILDING, FALLING AND YARDING

At the stage in which options are being generated, it is important to have a wide perspective as possible. You know what equipment you have, and it is not uncommon to want to conform your planning to fit the available equipment.

But there are times when it's important to look at other options. Of course, you can't go out and buy new equipment for every new activity. But what you can do is look at new ways to use available equipment. You might well find that just by making minor modifications that you know have access to an entirely new technique.

Innovation is the key. Discover new ways to use old equipment (such as this A-frame). And find new systems and options. Some examples include:

- yarding with a radio carriage
- using jacks and lining trees
- using alternative harvesting systems, such as balloon logging

Although innovative approaches may be applied to stream cleaning, this option should not be considered attractive. Instead, at the Planning phase you should be creating options that keep debris out of streams.
4. PREPARING PRESCRIPTIONS

Prescriptions fall into two categories:

- the actual field locations of roads and boundaries

- blue prints for roads and logging (plans/profiles; Pre-Harvest Silviculture Prescriptions; final setting maps) DISCUSS MAP MATERIAL

7 - 23 "Preparing Presc..."
7 - 24 Engineers working
7 - 25 Setting Map
7 - 26 Plan/Profile
7 - 27 PHSP
5. DECISION MAKING

It is necessary for the Planning department to make decisions, including both general decisions as well as those specific in nature.

There are times when the most basic or general decision — whether or not an area should be logged — is the most difficult one to make. But after spending the time, effort and money to gather information, generate options, etc., it becomes crucial to make that decision: will you log this area or not? (LINK TO SLIDE 7 - 29)

Other decisions to be made include:

- time factor: during what season should logging or road building take place
- what type of system will be used to log an area
- should the area be deferred for a few years

Specific decisions include:

- choosing locations for roads, landings and boundaries
- choosing methods for deactivating roads, landings and drainage structures

7 - 28 "Decision Making"
7 - 29 Deferred area
7 - 30 Bridge built in winter
7 - 31 Engineer on muddy road

6. PASSING ON INFORMATION
6. PASSING ON INFORMATION

There are three ways to pass on information:

- In the field: marking roads, streams and boundaries with specific colours and ribbons so that people recognize them.

- Producing paperwork: creating maps, blueprints and plans/profiles. Of course, this paperwork must be given to operators so they can see the design work that is planned.

- Verbal communication: staff meetings, safety and production meetings, tailgate and bush meetings. As well, take advantage of the personal contact you have with people — seeing them in the office, the cookhouse, the bunkhouse or out in the bush. These casual meetings can give you the opportunity to pass on information.

Regardless of the method used for passing on information, remember to keep the information clear, brief and free of technical jargon.
7. PERFORMANCE MONITORING AND FEEDBACK

It's important that the Planning department keep an eye on the job that people are doing and also let them know how they are doing. It is crucial that there is a two-way communication; the only way you will find out if your plan is sound is by listening to what the operators have to say. Again, I would like to stress this two-way communication, and you will see how everyone benefits: the engineers communicate the plans to the operators and the operators communicate any problems to the engineers. The plans can then be revised.

7 - 36 "Performance Monitoring..."
7 - 37 Engineer looking at truck and loader
7 - 38 Engineer looking at blowout culvert
8. DESIGNING AND IMPLEMENTING CORRECTIVE MEASURES

Simply put, it's necessary to clean up after the work is finished. This can include:

- cleaning out streams
- deactivating roads
- grass seeding
- protecting and rehabilitating streams

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9. ESTABLISHING RELATIONSHIPS WITH RESOURCE AGENCIES

You must come to a fundamental realization that you need to work with the agencies. And you can do this by:

- minimizing confrontational bargaining
- making commitments
- meeting deadlines
- dealing in a spirit of compromise
- establishing integrity and trust

Many of the guidelines require you to work with agency personnel on a continual basis. Your relationship with them is crucial to applying those particular guidelines.

READ FROM SLIDE

7 - 44 "Establishing relationships..."

7 - 45 Industry/agency people looking at stream

7 - 46 Activities requiring agency involvement
10. INTRODUCING OUTSIDE EXPERTISE WHERE NECESSARY

The processes and problems in some planning issues are very complicated; no one is expected to be an expert in all areas.

Recognize that there will be times when an outside opinion is needed to either help you make a decision or justify and validate your decision.

Outside experts include:

- soils and other resource specialists - internal audits
- suppliers' representatives (ie blasting)
- agency experts

7 - 47 "Introducing outside expertise..."

7 - 48 Soils expert looking at slide

7 - 49 Quarry blast being hooked up
11. KNOWLEDGE OF LOCAL CONDITIONS

There is no substitute for local knowledge.

Regardless of what area you are working on, keep in mind that it may be different from other areas in terms of:

- climate and weather patterns
- timing of fish migrations (slide)
- fish use of streams
- fisheries populations
- stability and usability of local materials

7 - 50 "Knowledge of local conditions"

7 - 51 Cutblock

7 - 52 Guidelines
   Appendix 3

7 - 53 Misty inlet
ROAD CONSTRUCTION

Video # 8

ROAD CONSTRUCTION

KEY SUCCESS FACTORS

The guidelines deal specifically with Road Construction on Pages 7 - 12. In order to apply these guidelines, the following key success factors are needed.

1. SAFE WORK ATTITUDE

Road construction is dangerous work, and safety is the Number One priority. If you believe you're in a situation that puts your safety at risk while you are trying to fulfill the guidelines, it is crucial to talk this over with your supervisor.

TIME: 2:46 Minutes

VISUALS

8 - 1 Title graphic
8 - 2 CFFG pages
8 - 3 Safe work attitudes
8 - 4 Backhoe building road

2. POSSESSION OF AND ABILITY TO ...
2. POSSESSION OF AND ABILITY TO INTERPRET PROPER ROAD DESIGN INFORMATION

This information should be provided to you by the Planning department.

There are two key points:

- you need to have the proper road design information
- you need to know how to interpret this information.

This proper road design information includes:

- plans/profiles
  (EXPLAIN ELEMENTS OF PLANS/PROFILES, GRADES, CUT/FILL, CULVERTS, X-SECTIONS)

- identified sensitive and unstable areas where side casting may be restricted
  (LINK TO SLIDE 8 - 7)

- stream prescriptions
  (LINK TO SLIDE 8 - 7)

- timing constraints

- areas where in-stream activity is approved/not approved

Most of this information is listed in the guidelines.
3. UNDERSTANDING THE CAPABILITIES AND LIMITATIONS OF BOTH EQUIPMENT AND PERSONNEL

More than just expediency is involved in making decisions.

The supervisory role or function is critical in determining appropriate equipment and personnel to be used in sensitive areas. It is not simply a matter of who is available and when they are available.

Scheduling and planning the operation so that the right piece of machinery is matched with the right staff is key to successfully achieving your goals.

If necessary, schedules can be revised and jobs can be delayed to ensure that the proper expertise and the hardware are available.

8 - 9 "Understanding the capabilities..."

8 - 10 Crew assembling bridge over river

8 - 11 Road being built on difficult terrain
4. ABILITY TO RECOGNIZE AND CONTROL MATERIALS

The ability to recognize and control materials depends on:

- hillslope processes:
  READ FROM SLIDE

You need to account for the fact that natural processes are going to alter or change the work that you do ....

- cut banks and roads have a tendency to slump down; fill slopes have a tendency to slide away ....

- Also be aware that materials are erodible. In other words, recognize that materials do have the tendency to be washed away by water ....

- recognize the stability of materials: those able to hold up their load .... and those that don’t

Materials can be either good, bad or marginal .... This slide shows good material, which can be used for road building virtually any time of the year ....

This slide shows bad material, which should be avoided at all costs ....

This is marginal material ... the difficulty with marginal materials is that they can be used in road building during periods of good weather, but they become highly erodible and unstable during periods of bad weather.

It needs to be stressed that roads built with marginal materials require an extra deactivation effort. As well, deactivation should take place promptly after use. Saving money by using marginal materials is always an important consideration. But remember, with marginal materials, you are in a high-risk situation and deactivation requires immediate attention, or you could end up with something like this ....

5. ABILITY TO CONTROL DRAINAGE
5. **ABILITY TO CONTROL DRAINAGE**

Do not assume that your system for controlling drainage is enough. Instead, look ahead and anticipate what would happen if that system failed, and how you would deal with this failure.

Relevant issues include:

- the need to recognize sources and volumes of water. These can be as small as seepage out of banks (LINK TO SLIDE 8 - 24 AND POINT OUT ARMOURED CULVERT OUTFLOW ...)

- or as large as major streams (LINK TO SLIDE 8 - 25 AND POINT OUT THIS LARGE CULVERT WAS BUILT OVER A DRY STREAM BED)

But no matter how small the volume of water may be, it needs to be recognized. In every case you must recognize where the water is coming from and how much water there will be. And this must be taken into account in the design and construction of whatever you are building, be it a bridge, road or culvert.

The need for proper deactivation and cross ditching of roads. The important elements of a cross ditch are shown in this slide. They are:

1) A ditch block to divert water into the cross ditch.

2) Proper angle in relation to the road to ensure that water makes the turn into the cross ditch.

3) Proper outflow or exit armoured with suitable material to ensure water does not erode the fillslope of the road.

Appendix 10 contains the MOF Roads Standards, with more detailed specifications.
Recognize and maintain the natural patterns of drainage. Drainage patterns of roads can alter natural drainage and put water on to unstable areas. This can result in landslides or sediment production. In this photo, water was diverted down the hill (from the top of the slide) to the crossditch (in the middle of the slide) and sent over the bank. ....

- the result was the landslide, which you can see in the center of this photo. This was caused by alteration of natural drainage patterns.
  (POINT OUT LANDSLIDE)

Build in fail-safe measures and self-maintenance:

- Long stretches of straight grades — as shown here (REFER TO 8 - 28) — tend to have more drainage problems.

- Roads that are designed with roller-coaster type grades (LINK TO SLIDE 8 - 29) have a built-in measure of self-maintenance. Also, water cannot run down these roads for long stretches.

- it’s crucial — particularly at the deactivation stage — that roads be left in a condition where no areas will cause water to run down any significant length. Berms, deep rutting and insloping keep water on the road, so they should be avoided.
  (LINK TO SLIDE 8 - 30)

- you should not rely on any particular drainage system to protect the road. In this picture, you can see the inadequate culvert at the right edge causing failure of the culvert on the left edge. Deactivation should include failsafing of existing culverts by cross-ditching over the culverts. In this particular photo, the culvert was plugged, and the cross-ditch saved the road.

- all drainage structures should be built not only to pass storms but also any debris or bedload material that is expected to go through them.
  (POINT OUT DEBRIS PLUGGING BRIDGE)
- the simplest type of drainage systems are those that are open and allow any amount of water or debris to pass over a protected surface. And these types of structures are self-maintained.

- wherever possible, deactivation should include removing any drainage systems that could fail

\[ 8 - 34 \text{ Armoured ford} \]

\[ 8 - 35 \text{ Culvert removed} \]
6. ABILITY TO RECOGNIZE AND BUILD FOR HUMAN USE AND ABUSE

It is key:

- to recognize how the road will be used
- to recognize who will use the road
- to recognize what type of action will take place after your operation is gone

Other considerations include:

- In many instances, metal pipes are susceptible to damage by yarding and loading equipment. So keep in mind that it's a good idea to avoid using metal pipes in active logging areas. Also, wooden culverts preserve fish habitat by leaving streambeds intact under roads.

- In this slide you can see a road that is spread over an installed culvert that is not long enough. It is important to realize that often the weight of logging trucks causes settlement in the roadbed. And when a culvert lacks that extra length, the road will settle and bury the culvert. This should be taken into account during the construction phase by installing extra culvert length.

- For road construction in active logging areas, take into account that even under ideal conditions, limbs and debris will end up in ditches for short periods. This calls for an extra size on culvert catch basins to ensure these roads will survive until we get back to clean them up. It should also be mentioned that metal culverts are more susceptible to being plugged by debris and should be used sparingly in logging areas.

  (EMPHASIZE TIMELY CLEAN UP)

8 - 37 Large load on logging truck

8 - 38 Smashed metal

8 - 39 Culvert too short

8 - 40 Ditch plugged with limbs
7. ABILITY TO INNOVATE, ADAPT AND EXPERIMENT

Road construction has been subject to almost constant innovation, development and adaptation for the past 50 years, and there is no reason to think that 50 years from now, present methods will be as obsolete as this picture is today.

Key to effectively doing your job while following the B.C. CFFG: your ability to innovate, adapt and experiment. And there are numerous ways to do this:

- use materials such as geotextiles, which have the potential to minimize sediment production
- use a silt fence when working next to streams
- use controlled blasting techniques
- become aware of modern technology and learn how to use it to your advantage whenever possible
- use compaction equipment on subgrade to reduce berms and grading
- recognize there are times that old methods can be used to solve new problems. For example, the self-maintaining armoured ford can help you to achieve the objective of creating a self-maintained road with minimal cost. Keep in mind that sometimes the old methods are the best methods to solve new problems.

8. ABILITY TO PAY ATTENTION...
8. ABILITY TO PAY ATTENTION TO APPEARANCE

Public access to our roads has increased. Also on the rise is media scrutiny of our operations. Subsequently, our performance is increasingly judged on appearances. Now we’re not here today to debate whether this is right or wrong. It’s simply a fact that we need to recognize and one that may require a number of different actions. With this in mind you should consider:

- management of overburden: this is always important. By managing or sorting overburden, you can save materials and also landscape the disturbed areas close to what is a natural state, a state that will once again grow trees. (LINK TO SLIDE 8 - 52)

- excess excavation produces berms and other areas unsuitable for growing trees, which remain as sources of sediment for extended periods

- landscaping of borrow areas is important (LINK TO SLIDE 8 - 54)

- and finally, be aware that garbage left behind on any operation is considered an indicator of how we are doing our job.

8 - 49 "Ability to pay..."
8 - 50 Grass seeded banks

8 - 51 Hoe sorting materials
8 - 52 Unbuilt road
8 - 53 Access logging
8 - 54 Mulched bare soil

9. ABILITY TO MAINTAIN WHAT ...
9. ABILITY TO MAINTAIN WHAT HAS BEEN BUILT

Always keep in mind the importance of maintaining surface, managing berms and crowing the road. (LINK WITH SLIDE 8 - 56)

In this photo, this logging truck has collapsed the poorly-maintained culvert ... culvert maintenance is important.

Culvert entrances and catch basins should be free of debris, and periodically clean out sediment that deposits there. This slide shows how unmaintained culverts can plug and collapse.

Clean out ditches periodically. Maintenance of ditches should also include grass seeding.

Bridges require periodic cleaning and inspections

8 - 55 "Ability to..."  
8 - 56 Well crowned road  
8 - 57 Collapsed culvert with log truck  
8 - 58 Plugged collapsed culvert  
8 - 59 Clean ditch  
8 - 60 Bridge washed out

10. KNOWLEDGE OF LOCAL CONDITIONS ...
10. KNOWLEDGE OF LOCAL CONDITIONS AND CONSTRAINTS

Every area or region has its own particular combination of climate, weather patterns, geology, soil materials, fisheries populations and time constraints. All these factors impact on road building in a different way.

To be successful at building roads in any given area, it is important to understand how these various conditions and constraints interact. Without local knowledge, I would suggest it's very difficult to know where to construct a sediment trap, such as shown here.
FALLING AND BUCKING

Video #9

FALLING AND BUCKING

TEXT

FALLING — KEY SUCCESS FACTORS

The guidelines deal specifically with Falling on Pages 13 - 21. In order to apply these guidelines the following Key Success Factors are needed.

1. SAFE WORK ATTITUDE AND PERFORMANCE

Falling is the most dangerous job in the woods, and safety has to be the Number One consideration at all times.

If you believe you’re getting into a situation that puts your safety at risk while you’re trying to fulfill the guidelines, it is important to discuss this with someone, such as an engineer.

VISUALS

9 - 1 Title graphic
9 - 2 CFFG pages
9 - 3 "Safe work attitude."
9 - 4 Faller working

2. POSSESSING AND INTERPRETING...
2. **POSSESSING AND INTERPRETING PROPER PRESCRIPTION INSTRUCTIONS**

The setting map is the most important piece of information that the Falling department is given.

The setting map should show:
(LINK EACH POINT TO SLIDE 9 - 5 & 9 - 6)

- the location and the classification of streams
- a detailed description of streamside management zone prescriptions
- identified unstable and sensitive areas, such as fisheries sensitive zones
- areas of potential windthrow
- topography information (steep and flat areas)
- the direction of yarding and landing locations
- location and instructions on SMZ

It is also crucial that the information provided on the map is understandable. The information should be presented in such a way that people can read and interpret it. For example, it is suggested that colour codes be used for the streams.

The map alone, while important, is not enough: it is also necessary to have on-site supervision, reviews and discussions with the engineers and supervisors.
3. GOOD COMMUNICATION WITH OTHER DEPARTMENTS

It is necessary to have on-ground reviews both before and during operations. During these reviews look at: problem areas that have been identified or noticed by the fallers; and prescriptions that were not workable. Example: trees that were expected to be felled away from the stream but couldn’t be.

The limits of faller’s discretion or faller’s choice need to be discussed in the field.

(REFERRING TO SLIDE: EXPLAIN SMZ FALLING PRACTICES; SHOW SMZ; SHOW STREAM; SHOW FILLED STREAMS)

This type of activity must be clearly and objectively discussed on the ground so that all involved parties have a clear understanding of what is expected.

It is also important to repeat or clarify information that is on the map. Example: if there is an area of potential blowdown, do not assume that because this information is available on the map that everyone will understand it.

Also crucial to good communication is establishing an arrangement for reporting unmarked channels, problem areas, or differences in plans.

If you find a stream that has not been marked or is not on a map, it is important that you do not fall trees across it until you have spoken to your supervisor.

There needs to be a clearly stated understanding between all parties on:

- how to deal with problems that have not been anticipated
- how to deal with streams that have not been marked

- how to deal with plans that ...
- how to deal with plans that were made but can't be achieved

The statement: "We can't get there from here" is important. Sometimes it needs to be said.
4. PROPER EQUIPMENT FOR THE CONDITIONS

I'm not here to teach you how to fall trees... you know how to fall trees. But a lot has been learned in watching the operations where there has been compliance with the B.C. Coastal Fisheries Forestry Guidelines and the operations where there has not been compliance to these guidelines... and the difference between these two operations. This difference is what I am addressing here.

Directional falling is key to achieving streamside protection. To do this, you need:

- powerful saws with long bars that can handle the timber in your particular area
- axes and wedges
- jacks
- line pulling capability (optional)

If you don't have jacks or line pull capability, it needs to be understood: you can't assume that you have the ability to push or pull trees over.
5. ABILITY TO ANTICIPATE PROBLEMS

Key to anticipating problems is looking at the setting map and the timber and at your own experience in the field, and predicting whether or not you can fulfill what is required. If you have been given instructions that can’t be achieved, then these instructions need to be revised, based on the input from the Falling department.

In this slide, for example, timber that would require directional falling may be too small for jacks or line pulling. If you were told to fall these trees away from a stream, it would be crucial to tell your supervisor if this were not possible.

It is important that the Planning department and Falling department work together as a team to anticipate problems.

In order to help you anticipate problems, look at:

- rot and defect in timber (LINK TO SLIDE 9 - 19) and how this will lead to debris problems later on (LINK TO SLIDE 9 - 21)
- steepness of the ground and how this will affect your ability to directionally fall
- deflection limitations (whether or not there is going to be lift at that site and how that will interplay with the lay of the timber). This often happens on large flat areas, such as shown here.
- wind conditions (whether or not these conditions will limit your ability to directionally

9 - 18 "Ability to ..."
9 - 19 Small streamside timber
9 - 20 Breakage in felled setting
9 - 21 Debris in stream
9 - 22 Faller working on steep ground
9 - 23 Faller working on flat
9 - 24 Faller working
YARDING AND LOADING

Video # 10

YARDING AND LOADING

KEY SUCCESS FACTORS

The guidelines deal with Yarding and Loading on pages 13 - 21. In order to apply these guidelines, the following key success factors are needed.

1. SAFE WORK ATTITUDE AND PERFORMANCE

As I mentioned earlier ... safety is the top priority. If you come across a situation that you believe puts you at risk while fulfilling the CFFG, talk to someone.

By planning your actions properly, you should not only be able to work safely, but also do your work with environmental protection in mind.

TIME: 2:51 Minutes

VISUALS

10-1 Title graphic
10-2 CFFG pages
10-3 Safe work attitude
10-4 Night logging
10-5 Tower setting up

2. POSSESSING AND INTERPRETING...
2. POSSESSING AND INTERPRETING PROPER PRESCRIPTIONS AND SETTING INFORMATION

Maps and communication are the keys to possessing and interpreting proper prescriptions and setting information.

The map should be discussed, not simply handed out.

If the assumptions and decisions that have gone into the making of the map are wrong, then the map should be revised. This information should also be communicated to those responsible for making the map.

The map should contain:

- identified sensitive and unstable areas (including fisheries sensitive zones, streamside areas and soil stability areas)
- the streams that have been identified and that streams that have been flagged. It is suggested that people use a colour-coding system on their maps to show which streams have been flagged. This colour-coding system can also be used to show where windthrow or potential windthrow exists so that various treatments can be prescribed there, such as selective logging of edges.
- topographic information to show steep and flat areas
- locations and instructions on Streamside Management Zones and a clear statement of the objectives for these zones: will they be completely left or will there be selective logging along the edges?
- yarding directions (and include the plan that was made at the time engineering was done)
- windthrow potential
- show specifically within the SMZ's the locations of tailholds. Note: where there are critical objectives of management in an SMZ it should be stated explicitly that tailholds should not be used in that area.

- landing locations

- detailed lift and deflection information in problem areas. When there are deflection lines on the ground, these should be marked on the map so people can see what work has been done, and refer to them if necessary.

- show where there is a need for upending and/or suspension of logs (LINK TO SLIDE 10-11)

- mark on the map when there are time constraints for activities. This slide shows how certain activities should only be undertaken during dry periods. This is particularly true for ground skidding and forwarding activities.

- show backspar locations and show where hoechucking and other specific work needs to be done from those backspar trails

10-11 Yarder working with good lift and deflection

10-12 Skid road with sediment running into ocean

10-13 Hoe chucking
3. GOOD COMMUNICATION WITH OTHER DEPARTMENTS

In the Yarding and Loading phase, planning is the key to good communication with other departments. This includes on-ground reviews with engineering both before and during operations.

Feedback about the plans and whether or not they will work is required from both the Y&L department and the engineering department. And in particularly sensitive situations, the engineers can be involved in the actual operation.

Objectives and techniques need to be discussed. The issue: how are we going to get there, must be sorted out beforehand. And whenever possible, this should be done in the field with all the relevant personnel.

Gully and debris management plans need to be addressed. Recognize that it is common for the Yarding operation to be done in or near gullies. Usually the easiest choice is to throw all the debris and waste right into the gully. But in many cases, this is not acceptable. This needs to be addressed beforehand to alert everyone to the problems.

Streamside management objectives are important to communicate. The information should be summarized on the map but also should be repeated orally so that everyone is clear about the objectives and how they will be accomplished.

In slides here you can see an area where this communication can have a direct bearing on how the site is impacted. In the first slide, you can see how the gullies were yarded across, in the next slide you can see the damage that resulted to the gully sidewalls. Better communication between Y & L and engineering will help to avoid some of these problems.

There is a need for a protocol for reporting unmarked streams, problem areas and changes in the plans.
4. ABILITY TO EVALUATE ALL RELEVANT INFORMATION AND INTEGRATE INTO AN APPROPRIATE YARDING PATTERN

In many cases, yarding patterns aren't established at the engineering phase due to unknown factors, such as where landings are best constructed.

It then becomes the function of the Yarding and Loading department to make these final decisions.

Backspar trail locations are also done by Yarding and Loading staff in many cases:

- it is necessary that their decision-making includes the objectives of streamside management and gully and debris management.

- the Y&L department cannot make decisions based strictly on expediency or on cost.

- I would like to stress that decisions about activities involving yarding construction, yarding pattern, backspar locations, tailhold locations and yarding direction must be made with the B.C. CFFG in mind.

There are specific guidelines that must be considered during these activities.

10-22 "Ability to evaluate all relevant..."

10-23 Tower and grapple

10-24 Grapple yader and backspar

10-25 Backspar trail diverting stream

10-26 Access log setting

5. PROPER EQUIPMENT FOR ...
5. **PROPER EQUIPMENT FOR THE CONDITIONS**

There is always a need to keep existing equipment busy and productive.

However, it is becoming more crucial that there be a more adaptable approach to the use of equipment. Also, to carry on business-as-usual should not be regarded as yarding every setting the same.

There is an increasing need for people to be innovative with their equipment and to use new ideas with their existing hardware in order to accomplish objectives in any given area. You don’t have to go out to buy new equipment in order to take a new approach in your system of operations.

Examples: - using radio-control carriages on grapple yarders
  - hoe chucking
  - wide right-of-way snorkel loaders

These are non-conventional systems using conventional equipment.

It is important to consider how equipment will impact on a site. For example, compare grapple yarders and towers and how they impact gullies:

Grapple yarders: yard straight down hill with debris dispersed in a windrow

Towers: more sidehill yarding with debris concentrated on landings

Note: Poor location for tower landing over stream

Each one has its place, depending on the site, deflections and road characteristics.

Another consideration: using equipment in combination. For example, hoe chuckers and grapple yarders can work well together to help avoid deflection problems or to work around areas of poor lift and deflection.
6. ABILITY TO ANTICIPATE PROBLEMS

Unstable terrain and tailholds:
- can affect yarding productivity, safety and site protection
- it's important to recognize such potential problems as early as possible
- from a fisheries standpoint: when you work along streams or near gullies and start pulling tailholds, there is usually the potential for sediment collection, debris problems and landslides

Lift and deflection:
- objectives of streamside protection or gully protection often can’t be met because there was not adequate deflection
- it's important that the Yarding and Loading department anticipate such a situation and pass on this information to the engineers

Unstable road fills:
- roads will be a limiting factor on your equipment regarding what you can and can't do. Wherever these bad practices have occurred in the past, they should be noted and dealt with.

Effects of seasons and weather on working conditions:
- includes wind, rain, snow, fire season and heat

Timber defects:
- there are usually more debris problems with stands which have high defect. This should be anticipated.

Unworkable prescriptions:
- soft or unstable ground should be anticipated

10-35 "Ability to ..."
10-36 Rock-anchored tailhold
10-37 Good deflection
10-38 Road fill held back by logs
10-39 Loader working in snow
10-40 Man bucking on landing
10-41 Backhoe being pulled out of mud

7. ABILITY TO LEAVE AN AREA...
7. **ABILITY TO LEAVE AN AREA IN SATISFACTORY CONDITION**

A determining factor in site impact is the condition of the site after the yarding and loading phases are finished.

**MAKE THE POINT AT THIS SLIDE**

*Keep ditches clean during operations.*

This includes rehabilitating backspar trails, as you can see in this picture.

Decompressing skid trails and restoring natural drainage patterns.

This also includes dealing with debris problems at roadside.

Debris temporarily piled on landings and then left can often cause landslides or other kinds of debris movement.

Avoid pushing out landings with cats because this generally creates unstable debris piles.

Another factor in debris management: how debris is left on roadsides and in ditches can have an effect on how the road washes out and how sediment is moved.

Such factors as haystacking to facilitate burning should be encouraged...but not in ditches or in creeks.

Surface water drainage of the road is impacted by: how debris is left piled and left lying around; how berms are handled; how ruts are left in the road.

Machinery dragged off the landing can result in a disruption of road drainage; this affects sediment production.

Last, but not least, is garbage: oil containers, old lines, line spools, etc.

With careful planning, the Yarding phase should be able to leave an area in good condition for silviculture activities and the fisheries resource.
SILVICULTURE

Video # 11

TIME : 3:40 Minutes

TEXT

SILVICULTURE

It is important to remember that silviculture operations can affect streams and fish.

While silviculture is primarily concerned with renewing forest crops, some of the activities involved can have effects on natural sediment and debris movement and on water quality. In addition, streamside areas and riparian vegetation are often affected by silvicultural activities.

Section 3 of the Coastal Fisheries/Forestry Guidelines deal specifically with silviculture. The key success factors needed to apply these guidelines are:

1. PREPARING PLANS AND PRESCRIPTIONS

The Pre Harvest Silviculture Prescription or PHSP is the most important document prepared by the silviculture department. PHSP’s include specific information and instructions designed to maintain the original function of the Streamside Management Zone. This includes preserving trees and understory along streams to maintain bank stability and a continuous supply of large woody debris. These trees and understory will also provide shade and litter to the stream. PHSP’s are the product of a long and very detailed planning process which includes:

(READ FROM SLIDE)
- review higher levels plans and information.
- Management and working plans
- Resource Folio information

- Resource agency information...

VISUALS

11-1 Title Slide
11-2 Backhoe in deep organic soils
11-3 CFFG Pages
11-4 "Preparing plans..."
11-5 Forester digging soil pit
11-6 Bullet list
- Resource agency information.
- Development plan correspondence
- Cutting permit and operational harvest maps
- Planning department local knowledge

After a preliminary review of information, a map exercise and field reconnaissance is required to verify the available information. Check any stream classification that has been done in the opening.

Further information should be collected on:

(READ FROM SLIDE)
- presence of fish
- location of barriers
- stream characteristics i.e. debris transport capability
- terrain and soil stability
- vegetation and potential brush problems

This work should be done at least two years ahead of harvesting. The detail and care taken in compiling and generating PHSP information is probably the most important job of the silvicultural department. PHSP's now represent a legal commitment for the management and protection of vegetation and watercourses.
2. PROTECTING FISHERIES VALUES DURING SITE PREPARATION

a) Mechanical site preparation
   - tends to be problematic in terms of sediment and debris production
   - types of equipment which are suitable must be evaluated to minimize impact on site
   - season of treatment needs to be considered to minimize fisheries impact
   - maintain distance from streams and areas of frequent flooding.

b) Prescribed fire

While it's often taken for granted, burning can have serious impacts on streams and streamside areas. As we see in this slide these impacts can include:

   - Loss of streamside vegetation.
   - destabilization and breakup of woody debris in channels
   - Increased sediment production in streamside areas
   - Loss of fish habitat diversity

As well, burning can aggravate hillslope processes and increase sediment production from logged areas and from poorly constructed roads as shown in this slide.

Planning for prescribed fire should be centered around the SMZ concept and the need to protect and manage riparian vegetation. Protection of SMZ's by sprinkling or other means may be required under the guidelines.

When using aerial ignition techniques, avoid mixing ignition materials near water bodies.
3. PROTECTING FISHERIES VALUES WHILE MANAGING VEGETATION

There are essentially two methods to manage vegetation:

a) Mechanical

The objective here is to reserve and protect streamside alder and riparian brush within the SMZ and to provide a long term source of woody debris.

Where trees are not required for bank or channel stability, you may fall alder away from streams where it can safely be done, and leave riparian brush species. Debris which enters the stream should be removed. Ensure that any streamside trees to be removed are not required for streambank stability, food, or cover for fish.

Consider non-conventional mechanical methods to manage vegetation as you see here.

b) Chemical

Of all silvicultural practices, chemical treatments have the potential for the greatest impact on fish. Foresters often contemplate this treatment in areas with extensive watercourses such as this. These areas are often "fishy" and are very sensitive to chemical treatments.

SMZ's and FSZ's which were protected during harvesting should not be destroyed during the silviculture phase by careless application of herbicides.

The Guidelines address the importance of chemical treatments and the use of glyphosate very specifically in Appendix 6 (Pesticide use supplement):

- All Class A and B streams require a 10 meter PFZ.
- Dry Class C streams may be over sprayed if there are no downstream concerns such as domestic water supplies or fisheries values.

- Buffer zones in addition...
Buffer zones in addition to the 10 meter PFZ are required for broadcast pesticide treatments. Their purpose is to protect the 10 meter PFZ. Their width is variable due to site conditions and specific recommendations from the agencies.

A wider Pesticide Free Zone may be required to protect SMZ’s and FSZ’s. The SMZ must be maintained and protected during silviculture operations.

Also key is having a plan in case of chemical spills or other emergencies. Storage areas, mixing areas, and loading areas should be located where there is no risk of spills into streams or lakes.

Personnel must be properly trained and have a pesticide applicators license. Appropriate safety gear must also be available.

There are two methods of chemical treatment, spraying and individual tree injection. Each one has its own set of considerations when planning to minimize fisheries impacts:

- For individual tree injection, avoid the SMZ and maintain a 10 meters PFZ as we described earlier. A buffer zone is not required for individual tree injection. It is crucial that boundaries be marked well in the field and on the map to ensure that these restrictions are observed.

- For ground based spraying activities, respect the SMZ and PFZ and establish a buffer zone for additional protection. These buffers ensure that while some spray drift will occur within the buffer, the integrity of the PFZ and SMZ will be maintained. Lay out these buffers with this objective in mind. Buffer zone width is variable to suit site conditions.

11-22 Hack and Squirt

11-23 Alder along stream

11-24 Streamside alder

- For aerial spraying activities, ...
- For aerial spraying activities, remember that these activities are more prone to fisheries related problems than ground based methods. Only dry Class C streams may be over sprayed, except where domestic water supplies and fisheries values are involved. Buffer zones are required to protect the 10 meter PFZ. Monitor weather patterns carefully to ensure that the buffer width is adequate. Buffer width is again variable, however aerial spraying generally requires wider buffers that ground based spraying activities.

11-25 Helicopter spraying herbicides
4. **PROTECTING FISHERIES VALUES WHILE SPACING AND PRUNING**

The key issue when spacing and pruning is debris management. Stream cleanout may be required when spacing or pruning introduces debris into a stream.

- Stay out of established SMZ's.
- Where there is no SMZ, fall away from streams. Trees which fall into streams should be removed immediately.
- Avoid mixing oil and gas near water bodies
- Avoid falling or girdling stream side trees.

Other activities such as commercial thinning require planning to minimize sediment production, manage debris, and protect streamside areas.

<table>
<thead>
<tr>
<th>11-26 Title Slide</th>
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<tbody>
<tr>
<td>11-27 Pruning</td>
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<tr>
<td>11-28 Spacer working</td>
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<td>11-29 Girdling</td>
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<tr>
<td>11-30 Commercial Thinning</td>
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| 5. PROTECTING FISHERIES VALUES... |
5. PROTECTING FISHERIES VALUES DURING AERIAL FERTILIZATION ACTIVITIES.

In addition to the operational phase section, the guidelines specifically deal with fertilizer application in Appendix 7:

- Fertilizer Free Zones are required on both sides of all Class A and B streams and lakes, as well as their flowing tributaries. In watersheds that have been designated as nutrient sensitive the FFZ will be 30 meters wide. In other watersheds, the FFZ will be 10 meters wide.

- Detailed maps showing the locations and size of the FFZ should be prepared for each treatment areas.

- Mark and map all streams for pilots during aerial spraying to ensure that fertilizer is not applied within the FFZ.

- Monitor weather conditions carefully.

- Locate heliports on dry landings.
6. COMMUNICATING WITH AGENCIES, FIELD CREWS, AND OTHER DEPARTMENTS.

Maintain good communications with agencies. Meet with agencies to discuss potential concerns and problems. Conduct on-site inspections where needed.

Develop a good treatment plan for contractors and crews. Spell out your expectations up front and as early as possible.

Ensure that field crews have an understanding of the project, what the potential problems are, what values are at stake, and what procedures to follow.

Conduct tail-gate sessions where critical fisheries values are in the area. Focus special attention on front line supervisors: make sure they are up to speed on the guidelines.

Ensure equipment, emergency procedures, and the details are up to standards.

11-36 Title Slide

11-37 Industry - Agency meeting

11-38 Tailgate with spacer

11-39 Backhoe doing site prep
7. PERFORMANCE MONITORING AND FEEDBACK

Maintain regular on-site inspections while work is in progress. Involve licensees, agency, and contractor personnel.

Document areas for improvement in performance. Communicate the need for improvement to contractors and field crews. For example, should these ditches be plugged during a thinning operation?

Monitor the effectiveness of the guidelines and be prepared to halt operations if a problem occurs. Organize a subsequent crew meeting and evaluate the severity of the problem. Call in resource agencies and re-organize the project.
8. DESIGNING AND IMPLEMENTING CORRECTIVE MEASURES.

Dispose of debris piled on roads and landings during yarding and loading operations.

De-activate roads and trails after silviculture activities are completed. For example, this backspar trail was converted back into productive forest.

Rehabilitate streams that have been impacted during silviculture activities such as commercial thinning or spacing, or site prep. Damaged streams should be reviewed with resource agencies prior to any activity being undertaken.

Clean up garbage during operations.

Grass seed areas that have been disturbed during site prep or salvage activities. Watch out for oversteepened slopes like this - grass seeding may not work.

The Coastal Fisheries/Forestry Guidelines contain many specific instruction on various silviculture activities. This training program was designed to give you a brief overview of them. You should be familiar with the various guidelines which pertain to the activity you are planning or undertaking, and observe these guidelines as necessary. There is no substitute for a thorough knowledge of the guidelines.
Site indicators of windthrow problems:

- Wet soil conditions
- Shallow rooted trees
- Evidence of old windthrow
- History of strong winds at the site
- Orientation of falling boundary at right angles to storm winds
How do you manage windthrow?

Some options include:
- Thinning the falling edge
- Topping and/or limbing large trees
- Expanding the SMZ to a windfirm boundary
- Orienting the boundary parallel to storm winds
Where will SMZ's be applied?

- On both sides of all Class A waters.
- On both sides of Class B and C waters where:
  - roots or large wood stabilize the channel.
  or
  - large streamside trees are required to provide future channel materials.
Can harvesting occur in an SMZ?

- No harvesting within 10 meters of the channel edge.
- Some selective harvesting may be approved outside of 10m depending on:
  - site conditions
  - maintaining stand structure and characteristics to ensure that what remains is still a functioning SMZ
Streamside areas provide:

- Large woody material for channel structure
- Root networks that stabilize banks
- Roots and large materials used as cover by fish
- Nutrients that support biological processes in the stream
- Food for fish:
  - flying insects which fall into the stream from the canopy
  - aquatic insects which feed on leaves and wood
Consequences of removing streamside vegetation:

• Reduced water quality
• Decreased channel stability
• Loss of channel structure
• Loss of cover for fish
• Loss of future sources of large woody materials
• Loss of wildlife habitat and recreational use

K.C. Council Fisheries - Forestry Guidelines Training Program
Information requirements for silvicultural planning:

- Presence of fish
- Location of fish migration barriers
- Stream characteristics (e.g. debris transport capability)
- Terrain
- Soil stability
- Vegetation and potential brush problems
Sources of Fisheries information:

- Management and Working Plans
- Resource Folios
- Resource Agencies
- Development Plan correspondence
- Cutting Permit and operational harvest maps
- Planning Department personnel
Strategies for Managing Sediment

- Avoid activities which contribute sediment to a stream.
- Keep sediment where it is.
- Capture sediment before it becomes a problem.
Adverse Effects of Sediment on Fish

- Reduced ability to feed
- Physical injury through abrasion
- Smothering of eggs
- Entrapment of alevins
- Filling in of pool habitat
- Loss of access and habitat in dewatered channels
Hillslope Processes

- Failure of oversteep cut and fill slopes
- Retreat of large cut banks
- Ravelling of fill slopes and sidecast banks
- Infill of ditches and catch basins
- Debris and landslides from upslope
- Decay and failure of wood fill materials
- Freeze/thaw erosion cycles
- Debris and sediment deposition in channels
The Coastal Fisheries Forestry Guidelines are a set of minimum standards for the protection of fish habitat, recognizing the co-existence of fisheries and forest management.
Adversarial Management  Co-operative Management

based on:
• win-lose bargaining
• confrontation
• command / control

based on:
• mutual benefit
• communication
• education

B.C. Coastal Fisheries - Forestry Co-operation Training Program
Adversarial Management

based on:
- win-lose bargaining
- confrontation
- command / control
Class A Streams:

- Commercial and/or Sport fish present
- Management Objective:
  - maintain productive capacity including:
    - water quality
    - stream channel characteristics
Class B Streams:

- Small resident fish present

Management Objective:
- maintain genetic stock of fish present
- maintain stream channel integrity
- protect downstream class A reaches
Class C Streams:

- Not used by fish
- Management Objective:
  - maintain stream channel integrity
  - protect downstream class A
    and B reaches
Elements of the Guidelines

Operational Phase Guidelines

- Planning and Road Construction
- Falling and Bucking
- Yarding and Loading
- Silviculture
Elements of the Guidelines

Appendices

- Glossary
- MoF Road standards
- Stream Reach Classification rationale
- Resource Agency agreements
- Fisheries freshwater timing information
- Herbicide use supplement
- Aerial Fertilizer instructions
- PHSP Agreement
- Fuel Storage regulations
CFFG Training – Benefits to Participants:

- Meet potential training requirements
- More job satisfaction
- Time and cost savings
- Better angling and recreational opportunities

B.C. Council Fisheries - Forestry Guidelines Training Program
Salmonids

Anadromous or Migratory Populations
- Salmon
- Sea-run Cutthroat trout
  Rainbow trout
  Dolly varden

Found in Class A Waters

Resident Populations
- Rainbow trout
- Cutthroat trout
- Dolly varden

Found in Class A & B Waters
Sources of Salmonid Mortality

- Fresh water habitat conditions
- Estuary and ocean predation
- Climatic changes - drought and floods
- Ocean currents and conditions
- Commercial, recreational, and food fisheries
Potential Impacts of Harvesting on Fish Populations

• reduced egg deposition
• reduced emergence of fry
• reduced rearing and survival from fry to smolt