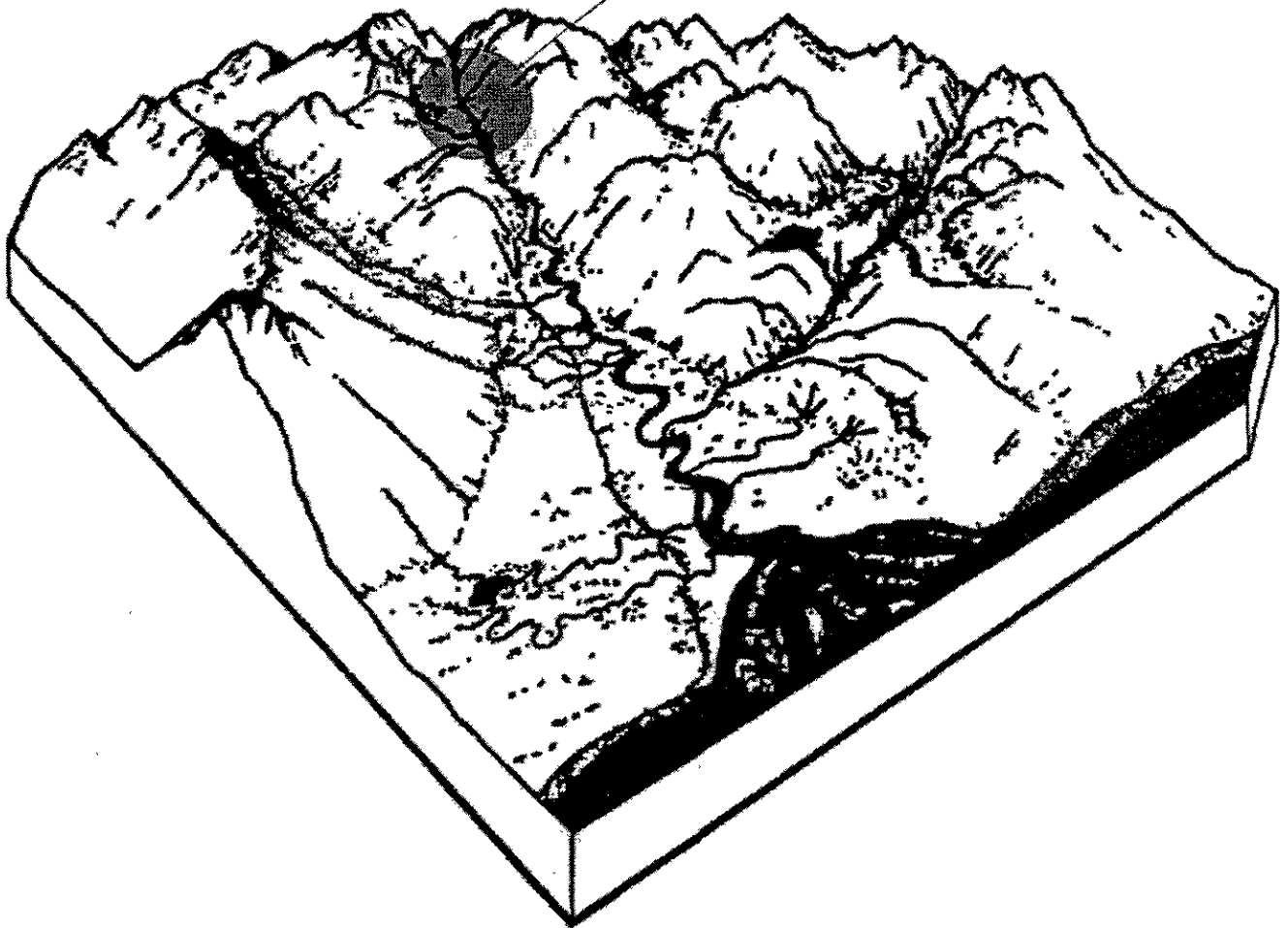
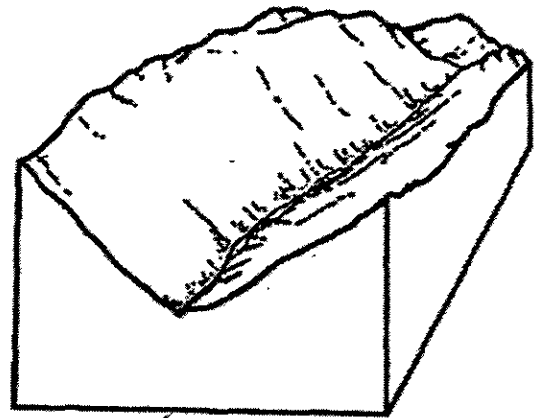


**MODERATE GRADIENT MIXED CONTROL PROCESS GROUP**

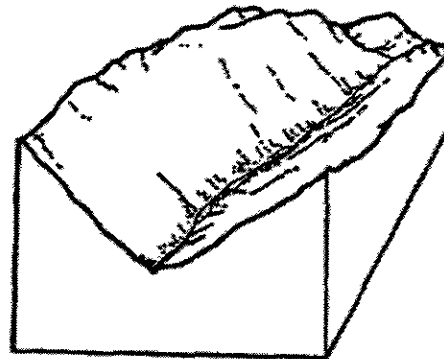
This process group includes MM1 (narrow) and MM2 (moderate width) mixed control channel types. These channel types are moderate gradient (2-6%) streams where sediment deposition processes are limited. Channel banks are frequently composed of boulder or bedrock materials that limit later channel migration and flood plain development along many segments of these channel types. High flows are mostly contained within the active stream channel. Riparian areas seldom extend beyond 30.5 meters (100 feet) from stream banks.



**NARROW MIXED CONTROL CHANNEL**  
 Channel Mapping Symbol: MM1 (Formerly B2)

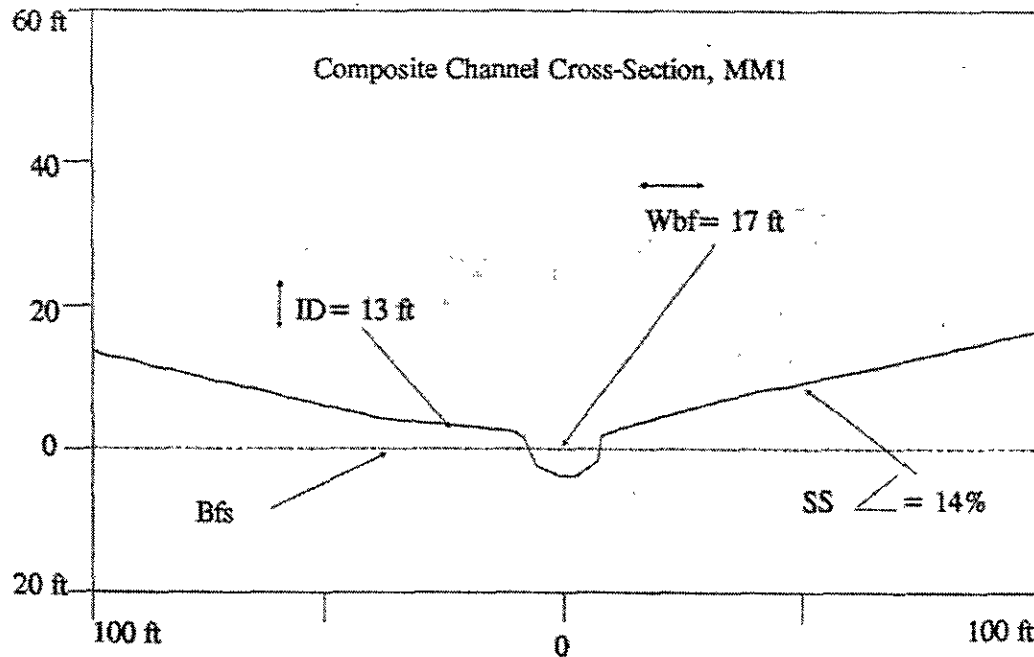
**PHYSICAL CHARACTERISTICS**

**Geographic Setting:** The MM1 stream is normally situated in the middle reaches of small drainage basins. Accordingly, drainage basin area is small. Commonly, an HC3 channel will precede an MM1 in the basin network. The MM1 will often flow into an MM2 reach. MM1 streams may also occur as upstream tributaries to FP3 and MC2 reaches. Bank material is normally a mixture of alluvial and colluvial deposits. Small bedrock knickpoints and short cascades or falls may be present.



**Similar Channel Types:** MM2, AF1

**Channel Structure**



- Stream Gradient: .....2-6%, mean = 3%
- Incision Depth: .....< or = 4 m (13 ft)
- Bankfull Width:.....< or = 10 m (33 ft), mean = 5 m (17 ft)
- Dominant Substrate: .....Fine gravel to large rubble (cobble)
- Stream Bank Composition: .....Mixture of alluvium and colluvium
- Sideslope Length: .....< 50 m (165 ft), mean = 42 m (140 ft)
- Sideslope Angle: .....Mean = 14% (8 degrees)
- Channel Pattern:.....Linear to slightly sinuous, single channel
- Drainage Basin Area:.....2.6-5.2 km<sup>2</sup> (1-2 mi<sup>2</sup>)

## INCHANNEL PHOTO: MMI



**Riparian Vegetation:** The riparian plant associations for the MMI channel type are dominated by the Western hemlock series. Nonforested Sitka alder and willow shrub communities dominate the MMI's phase.

Plant Association Series	% Cover	
	MMI	MMIs
Western Hemlock .....	30%	---
Sitka Spruce .....	29%	9%
Mixed Conifer .....	14%	3%
Nonforest .....	12%	62%
Mountain Hemlock.....	6%	7%
Western Hemlock-Red Cedar .....	6%	3%
Shore Pine.....	---	9%
Sitka Spruce-Cottonwood.....	---	7%

#### Channel Type Phases:

- MMIs - SHRUB PHASE is typically situated in the upper valley reaches of a watershed. Snow avalanche slopes are proximal to this channel. Riparian vegetation consists of brush species (Sitka alder and willow). Rearing capability for this phase is less than is typical for this channel type due to a lack of rearing habitat associated with large wood.

#### MANAGEMENT CONSIDERATIONS

**Hydrologic Function:** MMI channels are sediment transport oriented. Sediment inputs come from upstream, high gradient, contained tributaries. Stream energy is moderate due to channel gradient and flow containment provided by stable alluvial/colluvial banks. Most fine sediment is readily transported through these streams to downstream reaches. Large woody debris volume is substantial, but has only moderate retention of sand and gravel size sediment in these reaches.

## MODERATE GRADIENT MIXED CONTROL PROCESS GROUP

### Aquatic Habitat Capability

Large Woody Debris .....4000 ft<sup>3</sup>/1000 linear ft  
Available Spawning Area (ASA) .....Avg = 11% for 68 sites  
Available Rearing Area (ARA).....Avg = 18% for 68 sites

### Indicator Species Ratings

<u>MIS</u>	<u>ASA</u>	<u>ARA</u>
Coho.....	MOD	MOD
Pink.....	MOD	NEG
Chum.....	MOD	NEG
Sockeye.....	LOW	NEG
Chinook.....	LOW	LOW
Dolly Varden.....	HIGH	HIGH
Steelhead.....	LOW	LOW

MM1 channels are generally accessible to anadromous fish species. Downstream barriers account for most cases where access is restricted. Occasionally barriers occur at bedrock falls within MM1 streams. These channels are frequented by spawning coho, and, to a lesser degree, by pink and chum spawners. Use by spawning Dolly Varden char is also high. Where located next to accessible lakes, these channels provide moderate quality spawning habitat for sockeye salmon and steelhead trout. Rearing coho and Dolly Varden char frequently use these channels. Overwintering habitat is available where inchannel woody debris is abundant.

### Riparian Management Considerations

Concern for Management of:

Large Woody Debris ..... MOD  
Sediment Retention ..... MOD  
Stream Bank Sensitivity ..... MOD  
Sideslope Sensitivity ..... LOW  
Flood Plain Protection..... MOD  
Culvert Fish Passage..... HIGH

Large woody debris volume is relatively high in MM1 channel types. The large woody debris plays an important role in trapping cobble and gravel substrate used by spawning fish, and in the formation of pool habitat for rearing fish.

Stream banks are composed mostly of coarsely textured alluvial and colluvial sediments that are only moderately sensitive to disturbance. Stream bank vegetation does play an important role in bank stabilization (BMP 13.16).

Upstream migration of fish is a major concern when planning for stream crossing structures. Moderate channel gradients (3% mean) make it difficult to maintain adult or juvenile salmonid passage through culvert structures (BMP 14.17). Control of inchannel operations is also an important riparian management concern for these streams (BMP 14.14).

These are classified as Value Class I streams. A minimum 100 foot timber harvest buffer is required along both banks of these streams (Tongass Timber Reform Act, 1991).

**Riparian Management Opportunities:**

Sport Fish Potential..... LOW

Enhancement Opportunities ..... Large Wood Placement

Placement of large woody debris structures in MM1 channel types is a viable option for improving rearing habitat. Enhancement objectives should focus on creating deep pools that could provide overwinter rearing habitat. Creation of additional rearing area should be in proportion to the spawning habitat availability upstream.

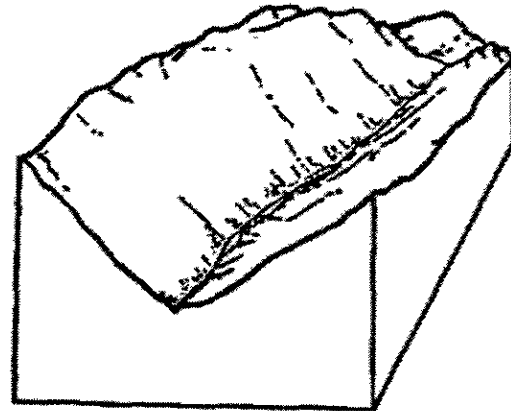
MODERATE WIDTH MIXED CONTROL CHANNEL

Channel Mapping Symbol: MM2 (Formerly B3)

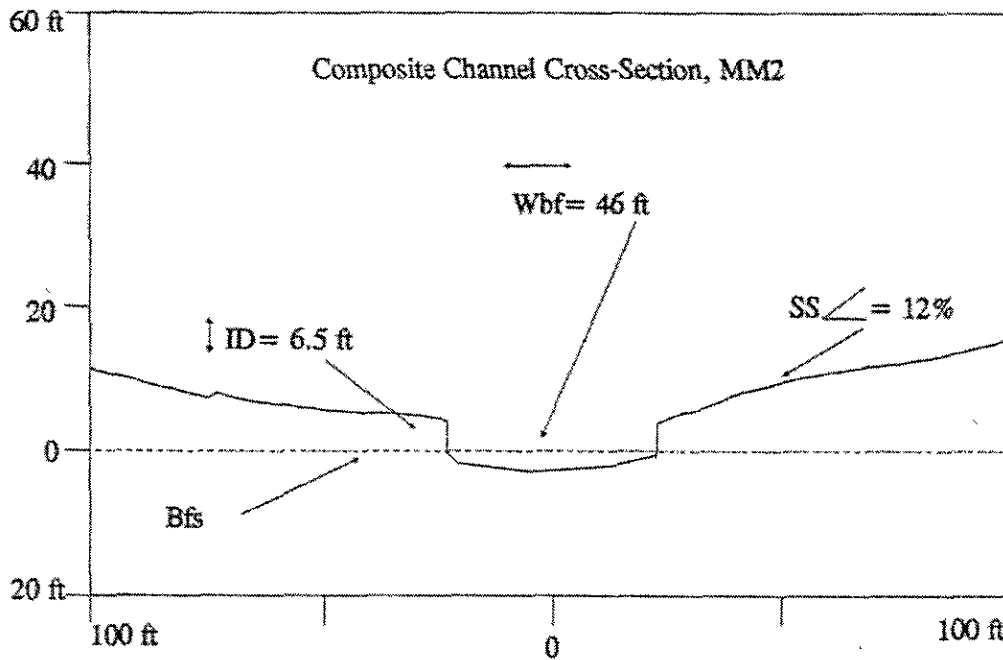
PHYSICAL CHARACTERISTICS

**Geographic Setting:** MM2 channels are normally found in the middle to lower portion of moderate size drainage basins. MM2 streams are often confined by mountainslope, footslope, and hillslope landforms, but they can develop a narrow flood plain. Bedrock knickpoints with cascades or falls may be present.

**Similar Channel Types:** HC3, MM1, MC2



Channel Structure



- Channel Gradient:.....2-6%, mean = 3%
- Incision Depth: .....< or = 4 m (13 ft), mean = 2 m (6.5 ft)
- Bankfull Width:.....> 10 m (33 ft), mean = 14 m (46 ft)
- Dominant Substrate: .....Gravel to small boulder
- Stream Bank Composition: .....Mixture of alluvium, colluvium, and bedrock
- Sideslope Length: .....Variable, mean = 14 m (45 ft)
- Sideslope Angle: .....Shallow, <20% (10 degrees), mean = 12% (7 degrees)
- Channel Pattern:.....Single, moderately sinuous channel
- Drainage Basin Area:.....5.2-13 km<sup>2</sup> (2-5 mi<sup>2</sup>)

INCHANNEL PHOTO: MM2



INCHANNEL PHOTO: MM2s



**MODERATE GRADIENT MIXED CONTROL PROCESS GROUP**

**Riparian Vegetation:** The riparian plant communities for the MM2 channel type are dominated by the Sitka spruce series and the western hemlock series. Nonforested Sitka alder and willow plant communities are dominant in the MM2m phase.

Plant Association Series	% Cover	
	MM2	MM2m
Sitka Spruce.....	48%	10%
Western Hemlock .....	26%	14%
Nonforest .....	13%	67%
Mixed Conifer .....	6%	---
Mountain Hemlock.....	4%	4%
Sitka Spruce-Cottonwood.....	---	4%

**Channel Type Phases:**

- MM2s - SHRUB PHASE is typically adjacent to steep mountainslopes subject to extensive snow avalanche activity. Riparian vegetation consists mainly of disturbance vegetation, alder and salmonberry. Large woody debris volume is comparatively low in this phase, therefore, fish capability may be lower.
- MM2m - MUSKEG PHASE is typically associated with glacially scoured lowland landforms. Riparian vegetation consists of mixed conifer scrub forest and muskeg bog species.

**MANAGEMENT CONSIDERATIONS**

**Hydrologic Function:** MM2 channels function as sediment transport systems. These channels have moderate stream energy. Fine sediment is rapidly moved through the MM2 channels. Large woody debris accumulations are extensive and help retain coarse gravels, portions of which will be mobilized during high flow events. Significant stream bank erosion and lateral channel migration can occur during high flow periods.

**Aquatic Habitat Capability**

Large Woody Debris .....7000 ft<sup>3</sup>/1000 linear ft  
 Available Spawning Area (ASA) .....Avg = 12% for 33 sites  
 Available Rearing Area (ARA).....Avg = 10% for 33 sites

**Indicator Species Ratings**

<u>MIS</u>	<u>ASA</u>	<u>ARA</u>
Coho.....	MOD	LOW
Pink.....	MOD	NEG
Chum.....	MOD	NEG
Sockeye.....	LOW	NEG
Chinook.....	HIGH	LOW
Dolly Varden.....	HIGH	HIGH
Steelhead.....	HIGH	MOD



MM2 channels are generally accessible to anadromous species, with several species of spawners using the moderate amounts of available spawning area (ASA). These channels have moderate amounts of rearing area which are used by coho, Dolly Varden char, and steelhead juveniles. Pools are relatively deep (mean pool depth = 0.41 meters [1.34 feet]), and are highly dependent on large woody debris. Overwintering habitat is primarily associated with these pools. When located next to accessible lakes, these channels provide good quality spawning for sockeye salmon and steelhead trout.

### Riparian Management Considerations

Concern for Management of:

Large Woody Debris .....	HIGH
Sediment Retention .....	MOD
Stream Bank Sensitivity .....	HIGH
Sideslope Sensitivity .....	LOW
Flood Plain Protection Need .....	MOD
Culvert/Fish Passage .....	HIGH

Large woody debris significantly influences channel morphology and fish habitat quality. Large wood volume is generally high. Large wood accumulations form pool and stream bank rearing habitat, as well as stabilize spawning substrate behind log steps. Maintenance of large woody debris sources is an important management concern (BMP 12.6).

Banks are composed primarily of unconsolidated cobble and gravel size materials, therefore, stream bank sensitivity is rated high. The volume and energy of flood discharge in MM2 channels are the major factors affecting bank erosion. Disturbance of streamside vegetation root mats may contribute to accelerated channel scour and lateral channel migration (BMPs 13.16, 14.17).

Flood plains associated with MM2 channel types are generally narrow, however, side channels and flood overflow channels are commonly found along MM2 reaches. Flood plain stability can be a concern in these uncontained channel segments (BMPs 12.6, 13.8, 14.13).

There is a high level of concern for providing fish passage through road crossing structures (BMP 14.17). Bridges are generally the appropriate stream crossing structures for MM2 channels. Culvert installations on these streams will not generally meet anadromous fish passage requirements. In addition, heavy woody debris loading and bedload sediment transport in MM2 channels pose a serious risk to culvert and bridge maintenance (BMP 14.20).

These are typically Value Class I or II streams. A minimum 100 foot timber harvest buffer is required along both banks of these streams (Tongass Timber Reform Act, 1991).

### Riparian Management Opportunities:

Sport Fish Potential .....	LOW
Enhancement Opportunities .....	Large Wood Placement

Much of the usable fish habitat in MM2 channel segments is keyed to large woody debris. Riparian management should emphasize future recruitment of large woody debris. Insertion of large wood structures is also an enhancement option.

**MODERATE GRADIENT MIXED CONTROL PROCESS GROUP**

