Channel Type User Guide Revision

(October, 2010)

Reasons for revision

The underlying reasons for the revision are to produce a logical demarcation of channel types within the established process groups and a descriptive label convention.

The **process groups** are based on primary differences in hydrologic function, landform, and channel morphology.

The individual **channel types** within a process group are determined by secondary differentia. These secondary differences are based mainly on channel width, and/or incision depth, gradient and channel pattern depending on process group. Channel width is dependent on the contributing watershed or drainage area. Stream channel width is apparent on aerial photography for the un-obscured streams and by field verification for the micro or vegetation obscured channels.

Tertiary differentia is an additional characteristics designated by channel type **phase**. These differences may or may not be apparent from resource aerial photography but are readily observed and measured in the field. Newer remote sensing technology, such as LIDAR, is useful for classification at this level.

Channel Type Classification Structure

Process group – primary (hydrologic function, landform, channel geometry)

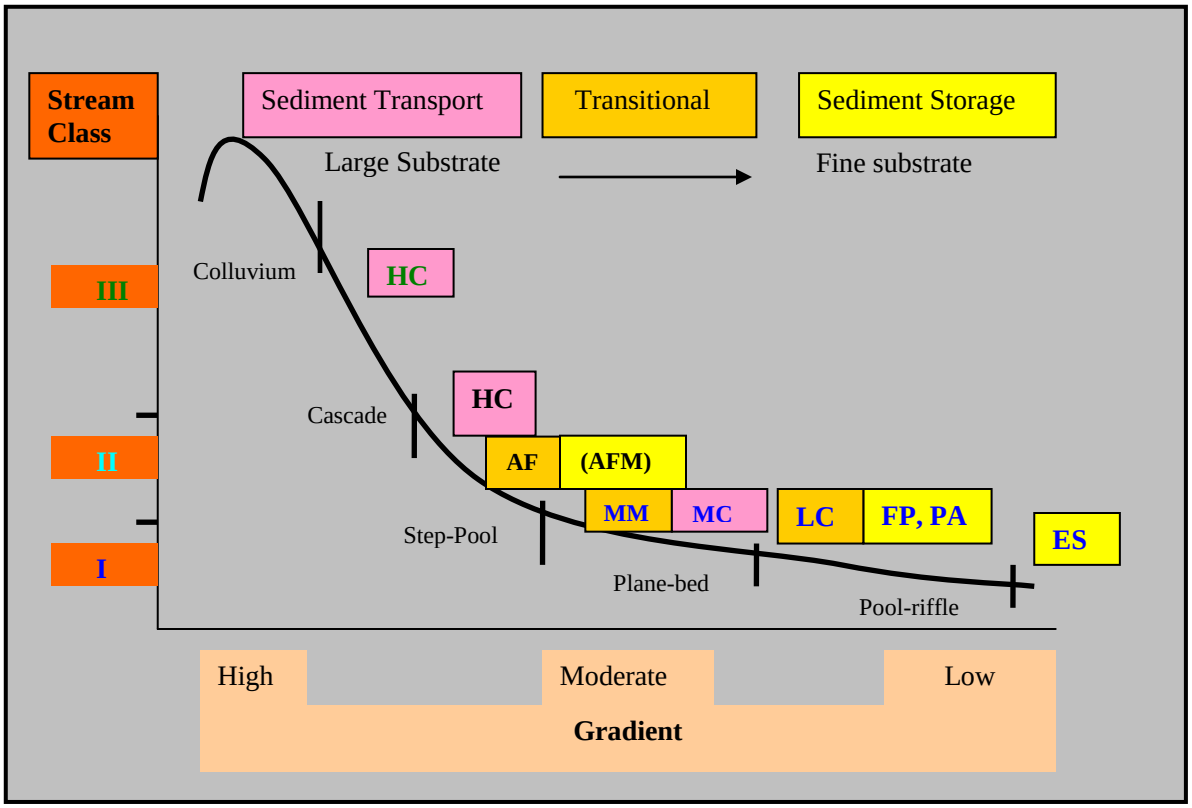
-Channel type – secondary (channel size, incision depth)

-Channel type phase – tertiary (specific characteristics)

Revised channel morphology ranges:

Channel Width		Channel Gradient		Incision Depth	
Micro	Less than 1.5m	Low	Less than 2%	Low	Less than 2 m
Small	1.5 to less than 10m	Moderate	2 to 6%	Moderate	2 to 6 m
Moderate	10 to 20 m	High	Greater than 6%	Deep	Greater than 6 m
Large	Greater than 20 m				

Stream class, sediment, substrate, Process Group vs Montgomery and Buffington channel types.



Alluvial Fan Process Group

AFO – Micro Alluvial Fan Channel
Bankfull width is less than 1.5m
AFM – Moderate Gradient Alluvial Fan, currently **AF1**
Gradient less than or equal to 6% at the midpoint of the fan
Bankfull width equal to or greater than 1.5m, more than one channel is a characteristic, and/or overland flow is evident
AFH – High Gradient Alluvial Cone Channel, currently **AF2**
Gradient greater than 6% at the midpoint of the fan
Bankfull width equal to or greater than 1.5m, more than one channel
Secondary differences are size and gradient.

Estuarine Process Group

ESO – Micro Estuarine Channel
Bankfull width less than 1.5m
ESS – Small Estuarine Channel, currently **ES1,ES2, ES3**
Bank full width 1.5 to less than 10m
ESM – Medium Estuarine Channel
Bank full width 10m to 20m
ESL – Large Estuarine Channel, currently **ES4**
Bank full width is greater than 20m
Proposed Phases for substrate differences:
ES_s for fine (silt/sand) substrate phase (ES1 converts to ESSs)
ES_g for gravel substrate phase (ES2 converts to ESSg)
ES_c for cobble to boulder substrate phase (ES3 converts to ESSc)

Flood Plain Process Group

FPO – Micro Flood Plain Channel, currently **FP0** (FP zero)
Bank full width less than 1.5m
FPB - Foreland Uplifted Beach Channel, currently FP1
FPE - Foreland Uplifted Estuarine Channel, currently FP2
FPS – Small Flood Plain Channel, currently **FP3**
Bank full width 1.5 to 9.9m
FPM – Medium Flood Plain Channel, currently **FP4**
Bank full width 10 to 19.9m
FPL – Large Flood Plain Channel, currently **FP5**
Bank full width greater than or equal to 20m.

FP_z – Flood Plain *X* side channel phase may be used to identify FPO and FP3 streams that function as side channels to FP4 or FP5 main stem channels. Habitat surveys of flood plain channels may lead to mapping the side channels as separate stream arcs, which would be channel typed by size and then hydrologic function by phase.

Glacial Outwash Process Group

GAF – Glacial Alluvial Fan Channel, currently **AF8**
GSC – Glacial Outwash Side Channel, currently **GO1**
GOS – Small Glacial Outwash Channel, new addition
Bank full width less than 20m*
GOM- Medium Glacial Outwash Channel, currently **GO4**
Bank full width 20 to less than 40m
GOL – Large Meandering Glacial Outwash Channel, currently **GO2**
Single channel: Bankfull width equal to or greater than 40m
GOB – Large Braided Glacial Outwash Channel, currently **GO3**
Multiple channels: overall width greater than 40m, mean = 65m.
GOC – Cirque Channel, currently **GO5**
GES – Glacial Outwash Estuarine Channel, currently **ES8**

* Channel width ranges are higher for this process group as glacial systems tend to be larger than the non-glacial island watersheds.
Secondary differences are size and channel pattern.
Glacial estuary, alluvial fan and high gradient are moved from their original process groups as the glacial flow regime is dominant.

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High Gradient Contained Process Group

HCO – Micro High Gradient Contained Channel, currently **HC0**
Bank full width less than or equal to 1.5m
Volcanic ash phase usually associated with deep incision, or add an 'i' to phase codes, for moderate to deep incision

HCL – High Gradient Low Incision Channel, currently **HC1** and **HC2**
Incision less than 2m
Channel width greater than 1.5m
HCLw- Sloping wetland or forested wetland phase, replaces **HC1**.

HCM – High Gradient Moderate Incision Channel, new channel though some current **HC5** and **HC6** channels may be reclassified as HCM based on field reconnaissance.
Incision 2 to 6m

HCD – High Gradient Deep Incision Channel, currently **HC4**, **HC6, HC9**
Incision greater than 6m
HCDw replaces the HC4, , HCDi replaces HC9

HCV – High Gradient Upper Valley Channel, currently **HC3**
Valley bottom location, incision variable
HCVi replaces **HC8**

Secondary differences based on revised incision depth ranges:.

- Low incision - 0 to less than 2m,
- Moderate Incision - equal to or greater than 2m to 6m
- Deep Incision - greater than 6m.

New phase (**HC_w**) is proposed to describe for sloping wetland location of HC channels**.**

Low Gradient Contained Process Group

Currently Large Contained Process Group

LCO – Micro Low Gradient Contained Channel
Bank full width less than 1.5m

LCS – Small Low Gradient Contained Channel, new channel
Bank full width 1.5 to less than 10m

LCM – Medium Low Gradient Contained Channel, currently **LC1**
Bank full width 10 to less than 20m

LCL – Large Low Gradient Contained Channel, new
Bank full width equal to or greater than 20m

LC_k Karst streams within this Process Group, designated at phase level

Note. **LC2** is currently described as Moderate Gradient Contained Narrow Valley Channel, streams labeled as such would be re-defined as **MCL** channels.

Moderate Gradient Contained Process Group

MCO – Micro Moderate Gradient Contained Channel
Bank full width less than 1.5m

MCS – Small Moderate Gradient Contained Channel, currently **MC1**
Bank full width 1.5 to less than 10m

MCM – Medium Moderate Gradient Contained Channel, currently **MC2 and MC3**
Bank full width 10m to less than 20m

MCL – Large Moderate Gradient Contained Channel, currently **LC2**
Bank full width equal to greater than 20m

MC_k Karst streams within this Process Group, designated at phase level

Moderate Gradient Mixed Control Process Group

MMO – Micro Moderate Gradient Mixed Control Channel
Bank full width less than 1.5m
MMS – Small Moderate Gradient Mixed Control Channel, currently **MM1**
Bank full width 1.5 to less than 10m
MMM – Medium Moderate Gradient Mixed Control Channel, currently **MM2**
Bank full width 10m to less than 20m
MML – Large Moderate Gradient Mixed Control Channel, new channel
Bank full width equal to greater than 20m
MM_k Karst streams within this Process Group, designated at phase level.

Palustrine Process Group

PAO – Micro Palustrine Channel
Bank full width less than 1.5m
PAS – Small Palustrine Channel, currently **PA1**
Bankfull width 1.5 to less than 10m
PAM – Medium Palustrine Channel, currently **PA**2
Bank full width 10 to less than 20m
PAL – Large Palustrine Channel, new addition
Bank full width equal to or greater than 20mer
PAH - Backwater or Groundwater Fed Slough, currently **PA3**
PAG – Backwater glacial Side channel, currently **PA4**
PAB – Beaver Dam/Pond Channel, currently **PA5**
Bank full width variable

Karst Process Group

Karst streams will be added as a **phase** designation under the LC, MC and MM process group. These are the most likely process groups associated with karst lithology.
In the GIS streams layer karst channels have been delineated where insurgent and resurgent streams connections have been verified.

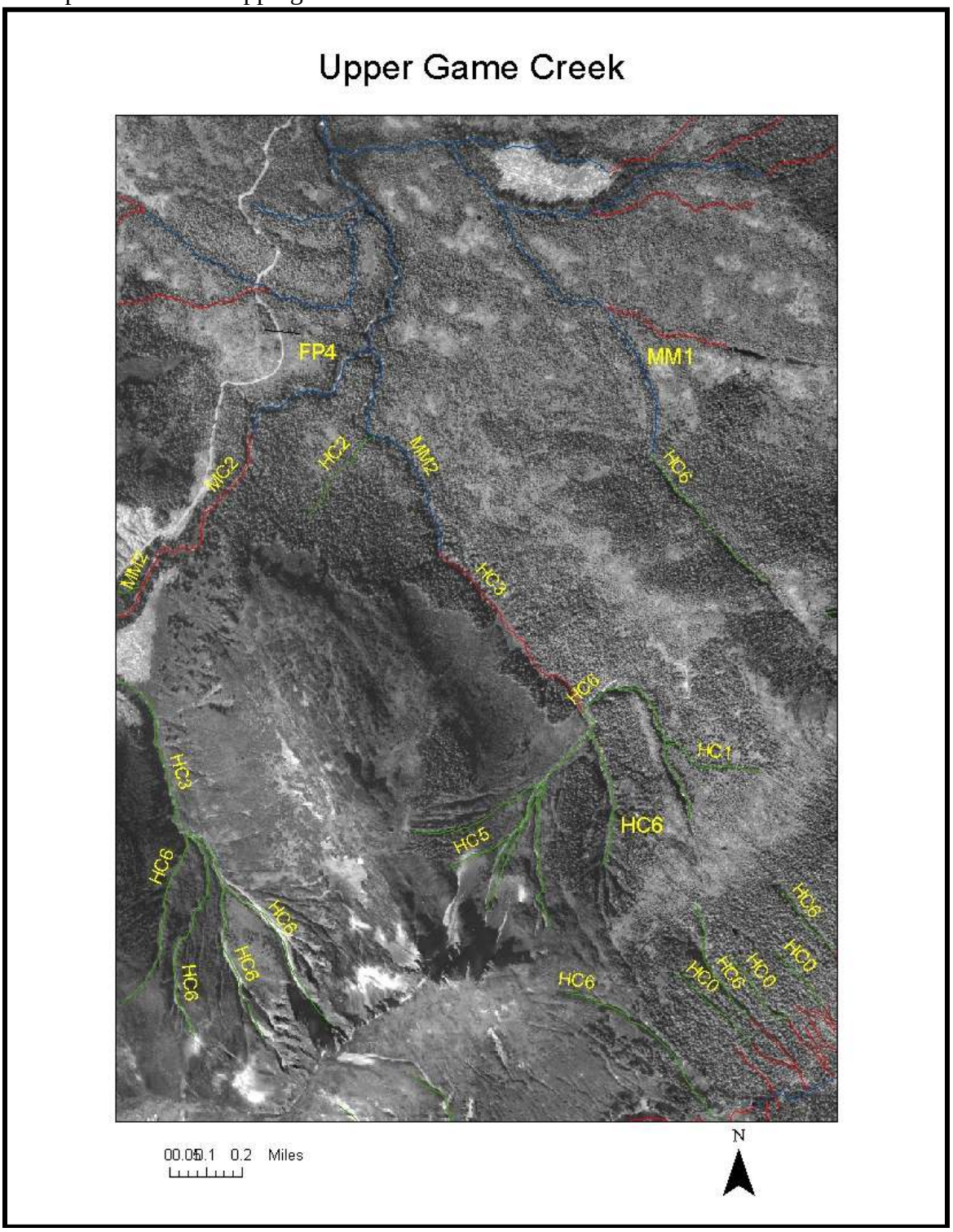
Special Channel Labels

UC- Unverified connector ,used for connecting field verified stream segment to the mains stem channel, normally a straight line arc in the GIS layer.
UI – Unverifiec intertidal connector, also a straight line segment to connect know stream segment to the shoreline or mainstem estuary channel.
NSC- No surface connection, straight line segment used to depict subsurface groundwater flow between a know AFH channel and the nearest downslope stream segment, stream class is '0'.

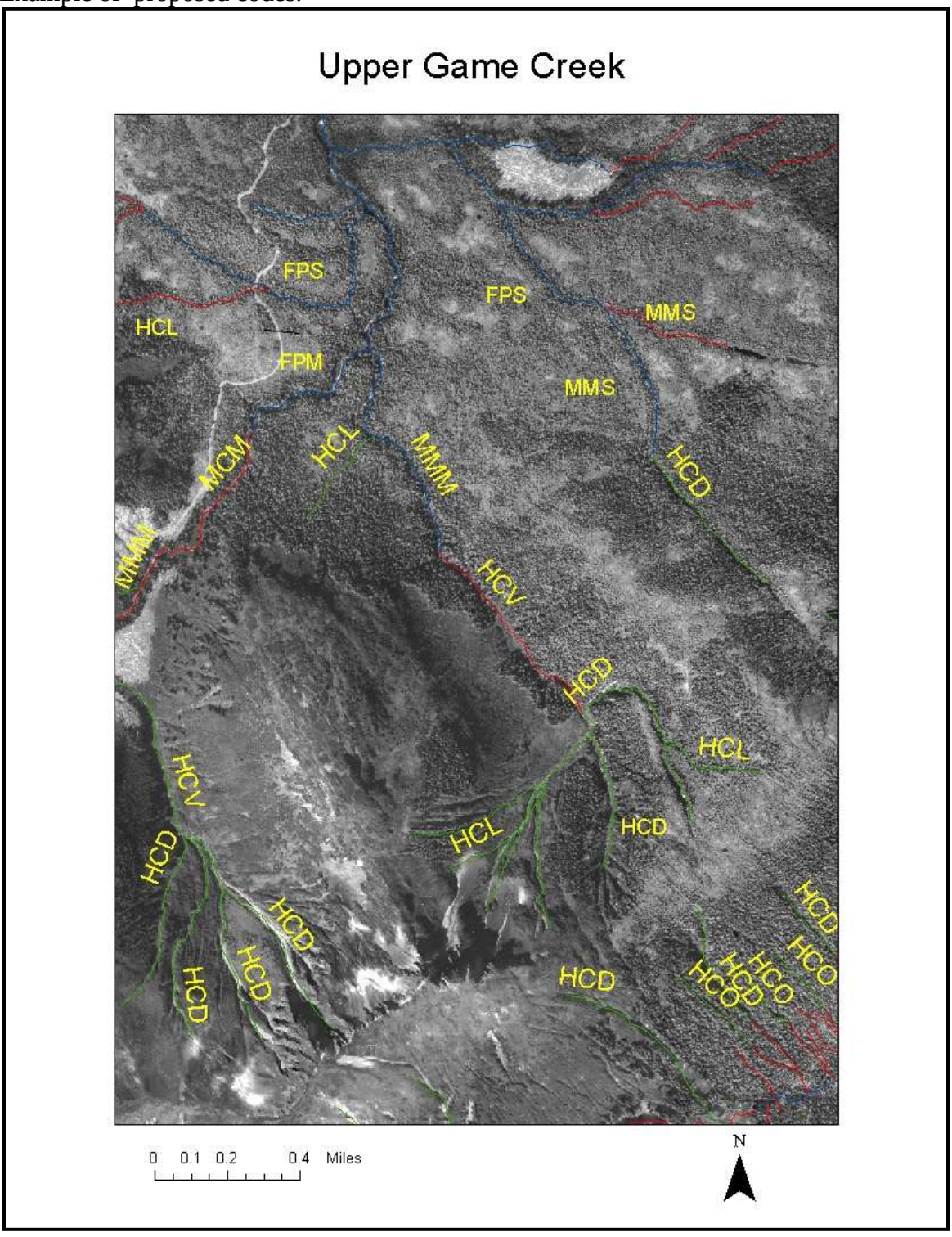
Cross Reference Table.

Current Label	Revision Label	Channel Description
AF0	AFO	Micro Alluvial Fan
AF1	AFM	Moderate Gradient Alluvial Fan
AF2	AFH	High Gradient Alluvial Cone
---	ESO	Micro Estuarine
---	ESS	Small Estuarine
ES1	**ESSs**	Small Estuarine, silt/sand substrate phase
ES2	ESSg	Small Estuarine, gravel substrate phase
ES3	ESSc	Small Estuarine, cobble to boulder substrate phase
---	ESM	Medium Estuarine + (substrate phases)
ES4	ESL	Large Estuarine + (substrate phases)
FP0	FPO	Micro Flood Plain
FP1	FPB	Foreland Uplifted Beach
FP2	FPE	Foreland Uplifted Estuarine
FP3	FPS	Small Flood Plain
FP4	FPM	Medium Flood Plain
FP5	FPL	Large Flood Plain
AF8	GAF	Glacial Alluvial Fan
ES5	GES	Glacial Estuarine
GO1	**GSC**	Glacial Outwash Side Channel (previously GOI)
GO2	GOL	Large Meandering Glacial Outwash
GO3	GOB	Large Braided Glacial Outwash
GO4	GOM	Medium Glacial Outwash
GO5	GOC	Cirque Channel
---	GOS	Small Glacial Outwash
HC0	HCO	Micro High Gradient Contained
HC1	HCLw	High Gradient Low Incision, wetland phase
HC2	HCL	High Gradient Low Incision
HC3	HCV	High Gradient Upper Valley
HC4	HCDw	High Gradient Deep Incision, wetland phase
HC5	HCM	High Gradient Moderate Incision
HC6	HCD	High Gradient Deep Incision
HC8	HCVi,	HCV glacial phase
HC9	HCDi	HCD glacial phase
LC1	LCM	Medium Low Gradient Contained
LC2	**MCL**	**Large Moderate Gradient Contained (PG change)**
---	LCS	Small Low Gradient Contained
---	LCL	Large Low Gradient Contained
MC1	MCS	Small Moderate Gradient Contained
MC2	MCM	Medium Moderate Gradient Contained
MC3	MCMr	Medium Moderate Gradient Contained, bedrock gorge
MM0	MMO	Micro Moderate Gradient Mixed Control
MM1	MMS	Small Moderate Gradient Mixed Control
MM2	MMM	Medium Moderate Gradient Mixed Control
---	MML	Large Moderate Gradient Mixed Control
PA0	PAO	Micro Palustrine
PA1	PAS	Small Palustrine
PA2	PAM	Medium Palustrine
PA3	PAH	Backwater/Ground Water Fed Slough
PA4	PAG	Backwater Glacial Slough
PA5	PAB	Beaver Dam/Pond
---	PAL	Large Palustrine

Example of current mapping.



Example of proposed codes.



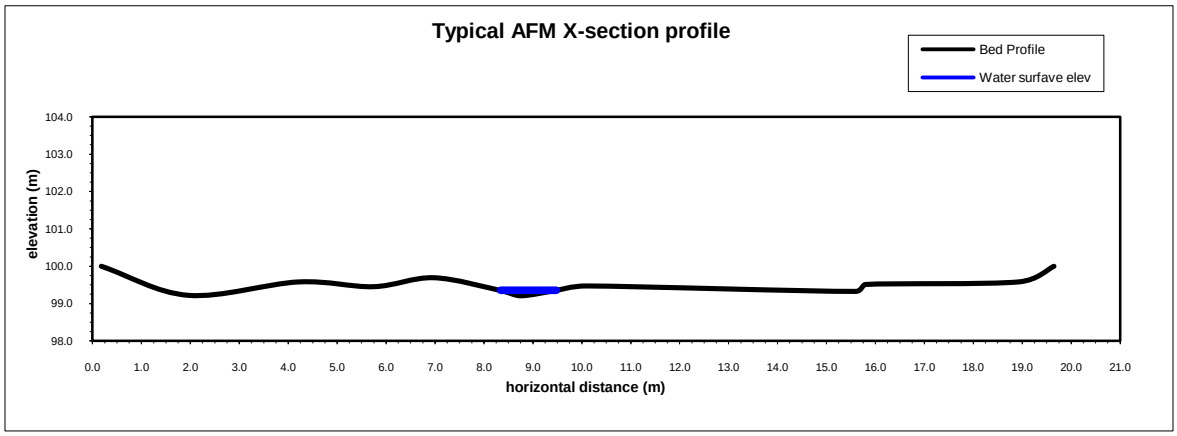
Channel Type Phases

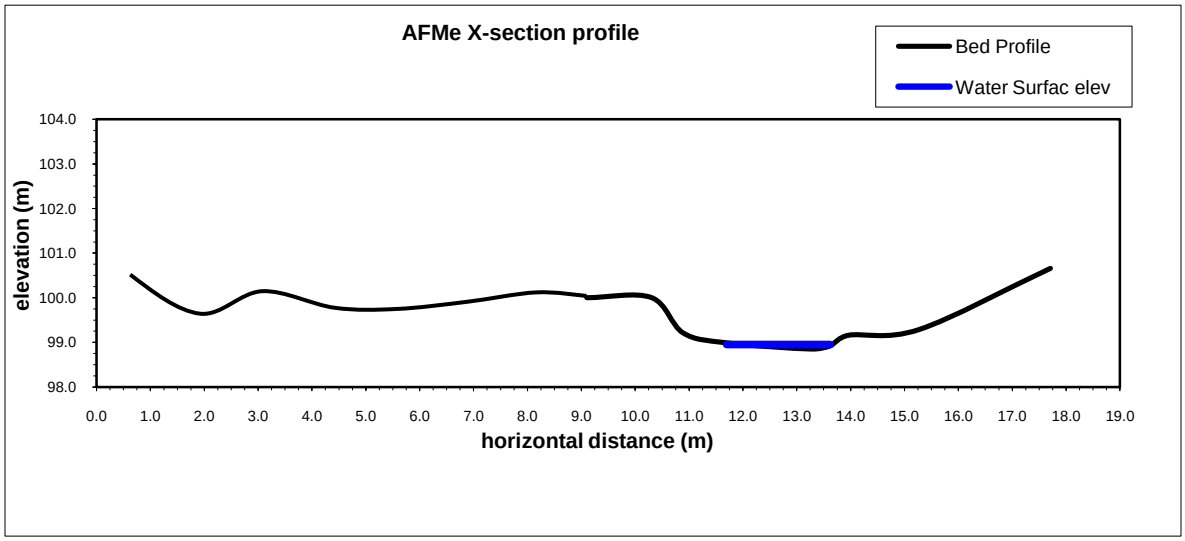
Current Phase label	Current Phase Description	New Phase label	New Phase description	Most Applicable PG	Most Likely Location
a	Volcanic ash	a	Volcanic Ash	FP, HC	Kruzof
b	Bedrock influence	b	Boulder substrate	ES, FP	
		c	Cobble substrate	ES, FP	
d	Sand dune	d	Sand dune	ES	Yakutat
		e	Entrenched channel	AF	
f	Foreland forest riparian vegetation	f	Foreland forest riparian vegetation	FP	Yakutat
g	Glide phase	l	Glide Phase	LC	
		g	Gravel substrate	ES, FP	
s	Shrub riparian vegetation	h	Shrub, non-forest riparian vegetation (willow/alder)	FP	mainland
		k	Karst geology	LC,MC,MM	POW, karst lithology
		i	Debris flow	HC	
l	Large substrate	c or b			
m	Muskeg	w	Wetland or forested wetland	HC, MM, MC, FP	
r	Moraine	o	Moraine	LC	Glacial moraine deposits
		p	Beaver dam complex	FP	
		r	Bedrock/gorge	MC	
		s	Silt/sand substrate	ES, FP	
v	Scrub forest riparian vegetation (Sitka alder, shore pine)	v	Scrub forest riparian vegetation (Sitka alder, shore pine)	PA	
		z	Side channel	FP	

Channel Type Description Amendments

AFM – Moderate Gradient Alluvial Fan

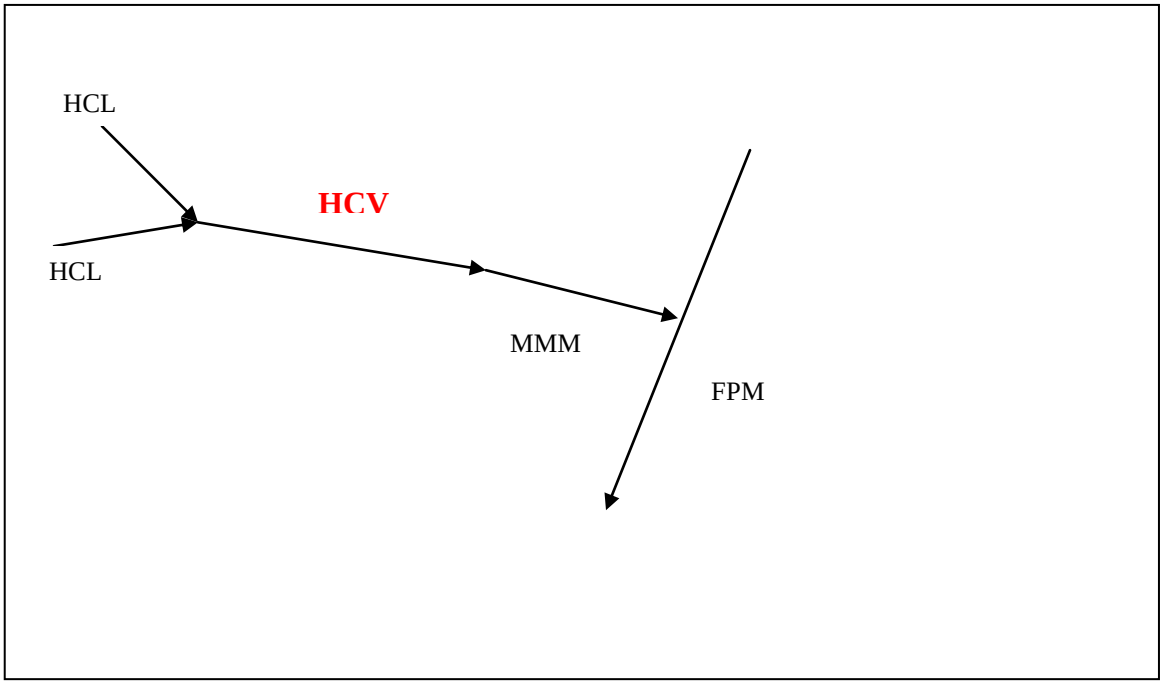
Entrenched Phase: The bedload deposition process that produces the alluvial fan landform may be episodic rather than a constant rate of delivery. The upstream supply source may lie dormant for years before a mass wasting event provides material for transport. "Older' alluvial fans may be in a dormant bedload delivery state allowing the stream to downcut through the deposited material. This channel entrenchment is not apparent from remote sensing. Field observation is needed to establish this entrenchment (e) phase of the AF channel type.





HCV – High Gradient Upper Valley Channel

The landscape position is the distinguishing differentia. This channel is positioned in the upper valley bottom immediately below the headwater HC channels. The two examples of channel type mapping illustrate the typical position in the stream channel network. Below is a simple line diagram of the typical HCV position.



Flood Plain Channels and Beaver Dam Complex

Beavers can have a dramatic effect on morphology of flood plain channels. Beaver dam inclusions on gravel bed flood plain channels may be too short of length to depict as a separate channel type i.e. PAB. A riffle/pool sequence may exist immediately upstream and below the beaver dam. These dams are easily ruptured by high flow events once abandoned and no longer actively maintained by beavers. After the dam ruptures a layer of fine sediment may remain on the adjacent flood plain.

These dams are temporary and may not be apparent on aerial photos and orthophotos due to obscuring canopy or post dating the photography.

Proposed mapping label: FP*X*p.

The flood plain is the dominant channel type, and the beaver dams are temporary aberrations. Depending on project needs depicting these dams as separate channel types in the project stream layer is an option. In the corporate stream layer the FPXp label would be used. National wetland mapping and the soils layer may also be useful in identifying these complex channels.

Figure 1. Beaver dam on FPS (FP3) , note gravel bed below dam, wetland vegetation upstream

Figure 2. View from further downstream, forested riparian vegetation, riffle section.

Figure 3. FP channel above beaver dam, coarse gravel substrate.