Snow Survey Procedure Update

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Why an update to the snow survey program?

- Out-of-date manuals
- Inconsistency in data collection
- No standardized training across agencies
- ***53 different*** cooperating California agencies
- Need to bring snow measurements—and recording—up to industry standards

Goal: To collect as accurate SWE data as possible, and do it in a safe and efficient manner.

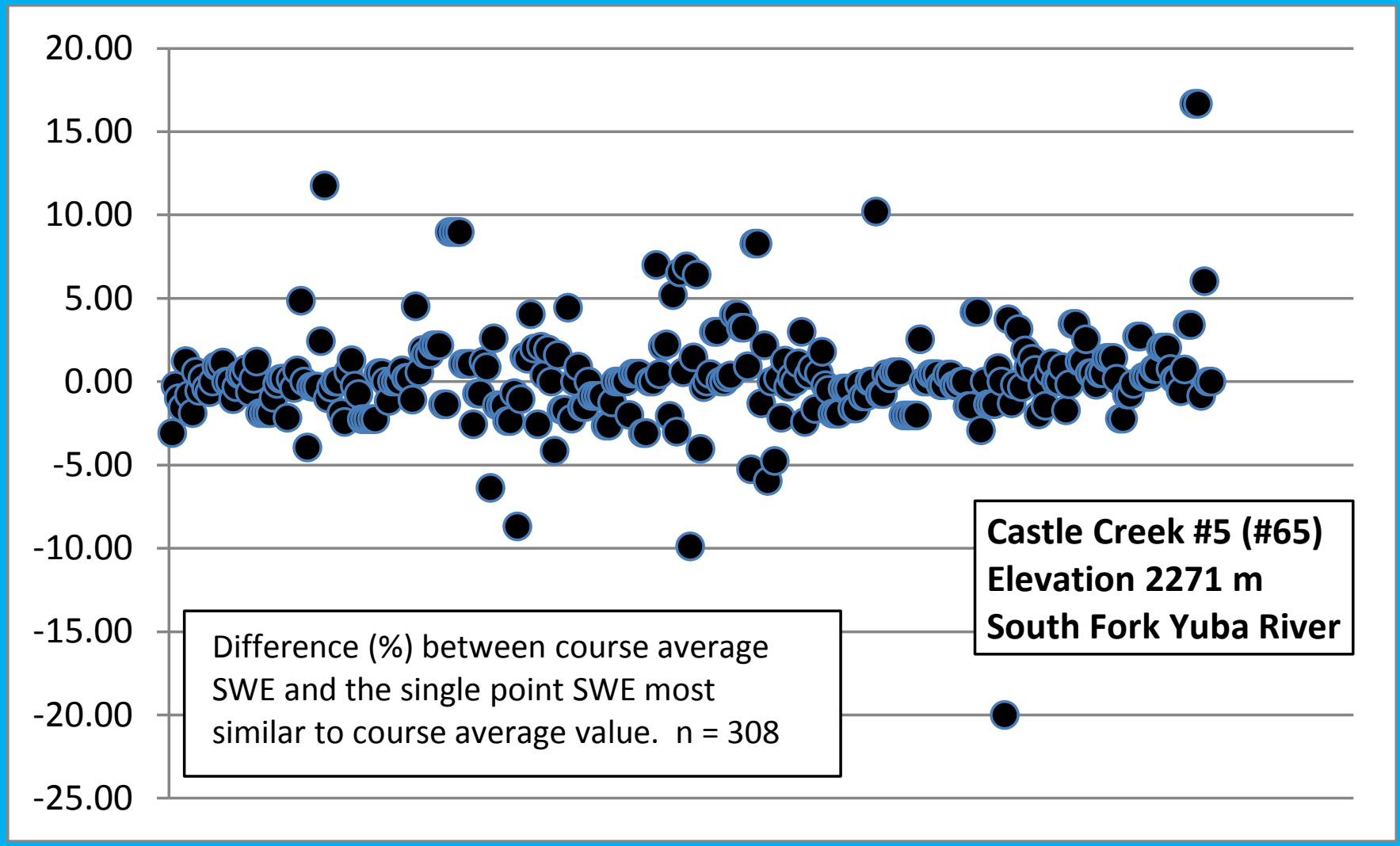
Snow Survey's Handbook **and** ***Procedure Manual*** **will address:**

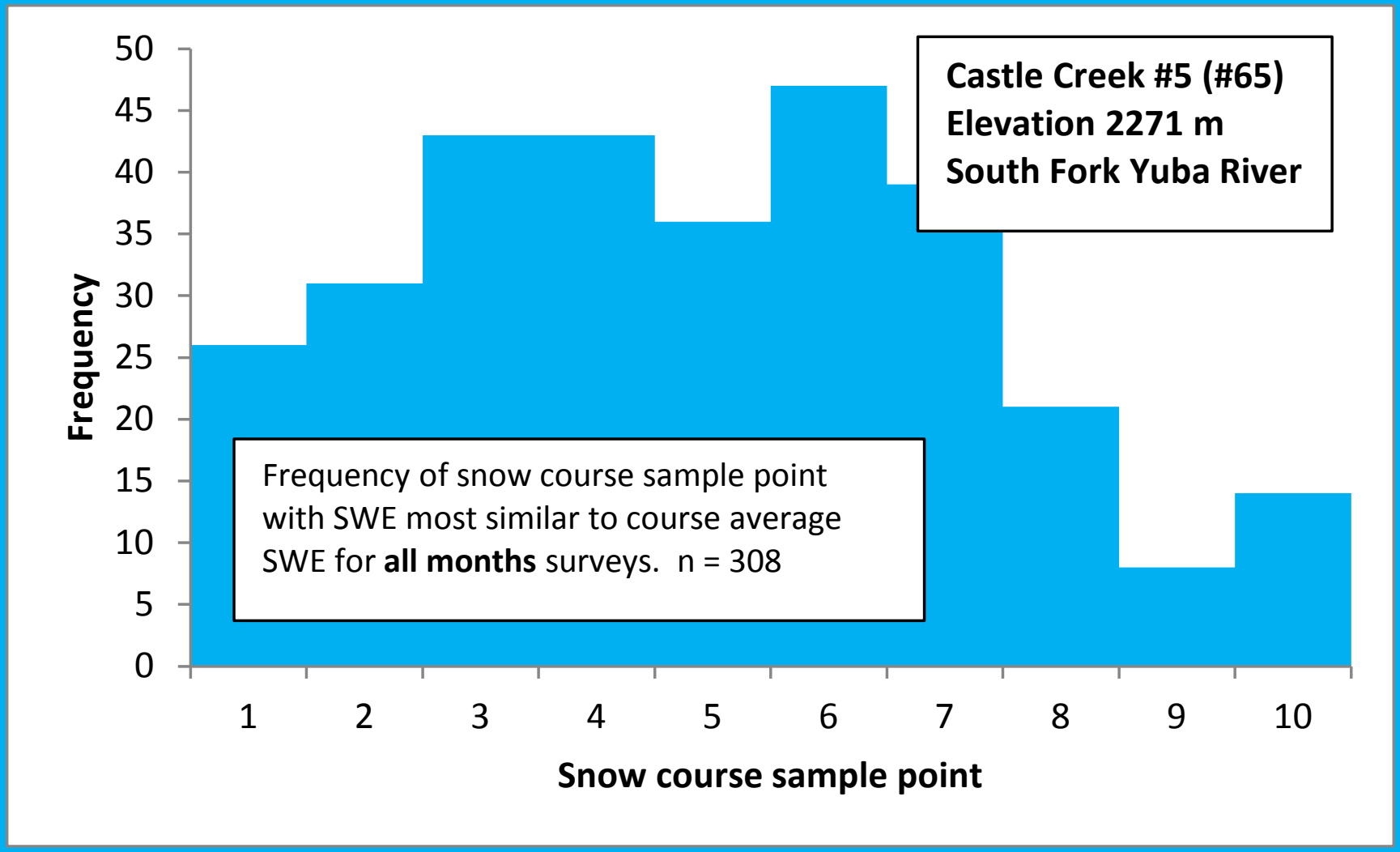
- ❑ Measurement and recording
- ❑ Equipment: types, care, maintenance
- ❑ Snow course maintenance
- ❑ Surveyor safety

Recommendations for Winter 2014:

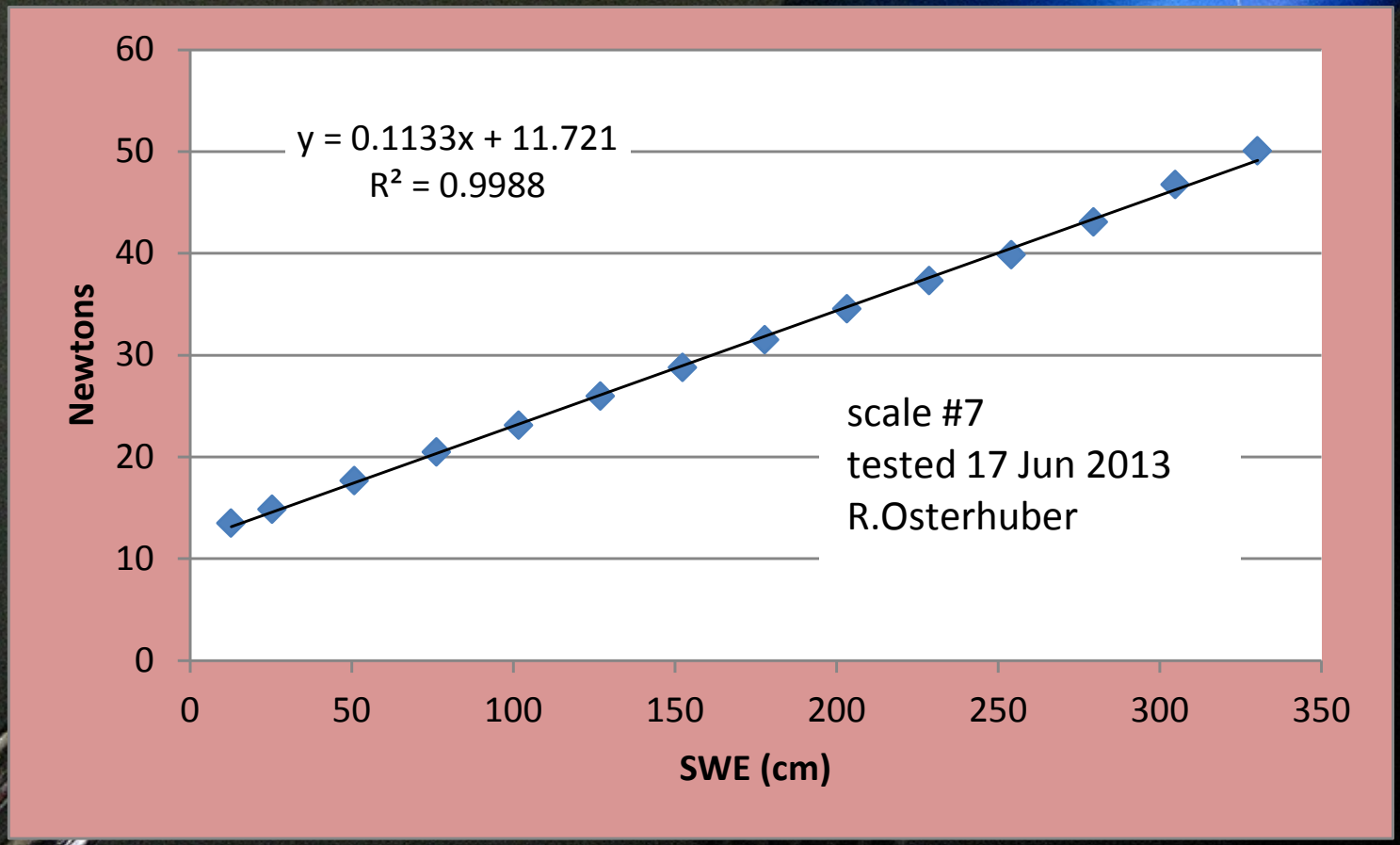
- ***HS*** = "Height of Snow" = total snow depth at any one point in time/space
- Date format = 20131107
- Offset transect lines ~1-2 m for each month's survey
- Sample density range does not have to be ≤ x %
- A fairly consistent core length/HS ratio
- Surveys don't have to start with measuring sample #1
- Half-inch resolution data recording (47 ≠ 47.0)
- Professional field notes ***should never be erased***—using ink OK
- Limited time and/or sample difficulty → concentrate on "golden" sample points

“Golden” sample points = those that most closely approximate snow course average




Castle Creek #5 (#65)
Elevation 2271 m
South Fork Yuba River
Frequency of snow course sample point with SWE most similar to course average SWE for **all months** surveys. n = 308
Frequency
50
45
40
35
30
25
20
15
10
5
0
1
2
3
4
5
6
7
8
9
10
Snow course sample point

Snow tube scales should be highly linear over their entire range

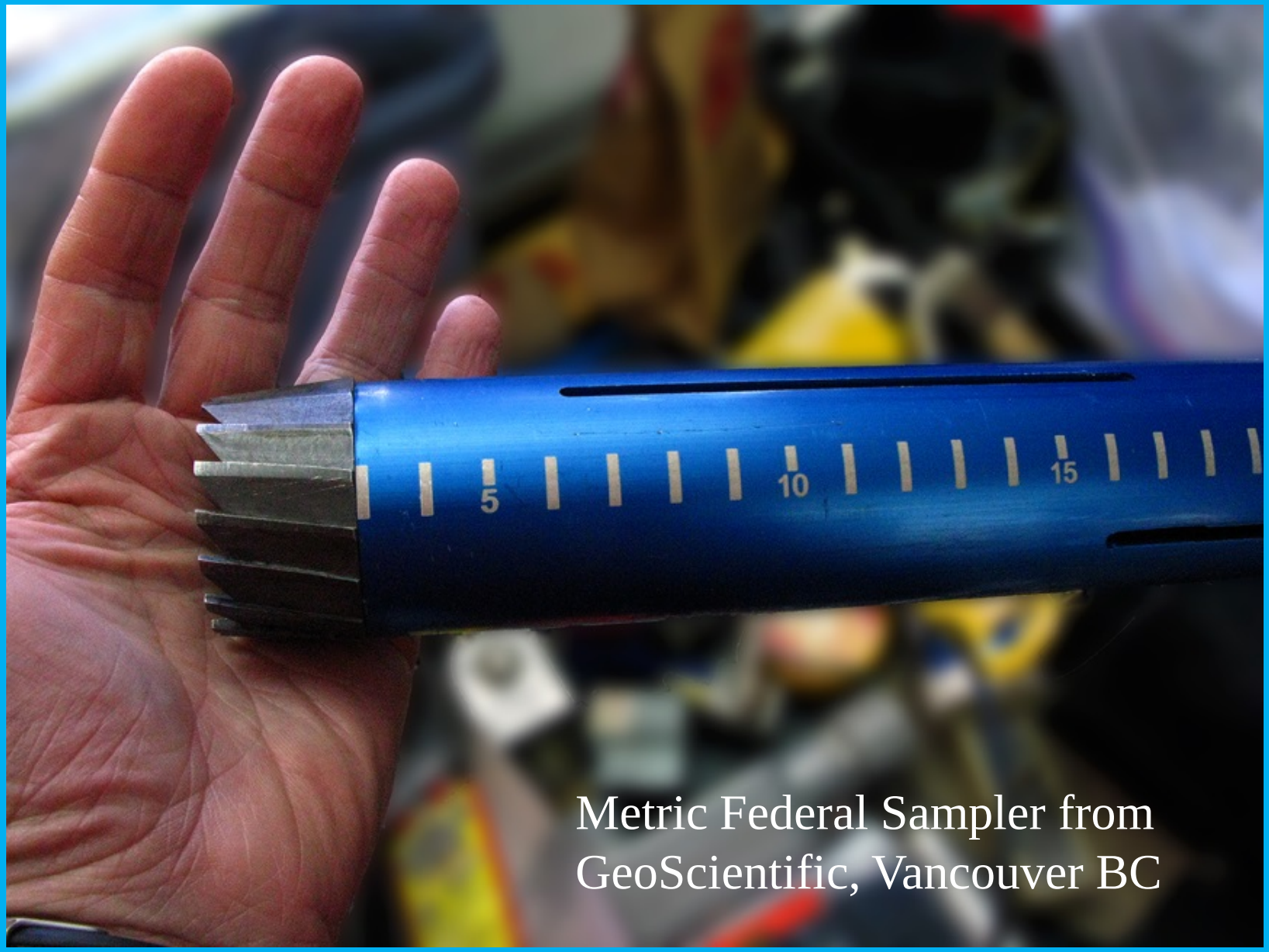


An easy test of a scale's linearity:

bucket and
200 ml water + 200 ml + 200 ml + 200 ml…

Recommendations for Winter 2015:

- ❑ Metric units
- ❑ Digital data submittal
- ❑ New survey forms—bring back WX, SNX, AVX obs
- ❑ Bottom two sections “billit” tube



Metric Federal Sampler from GeoScientific, Vancouver BC

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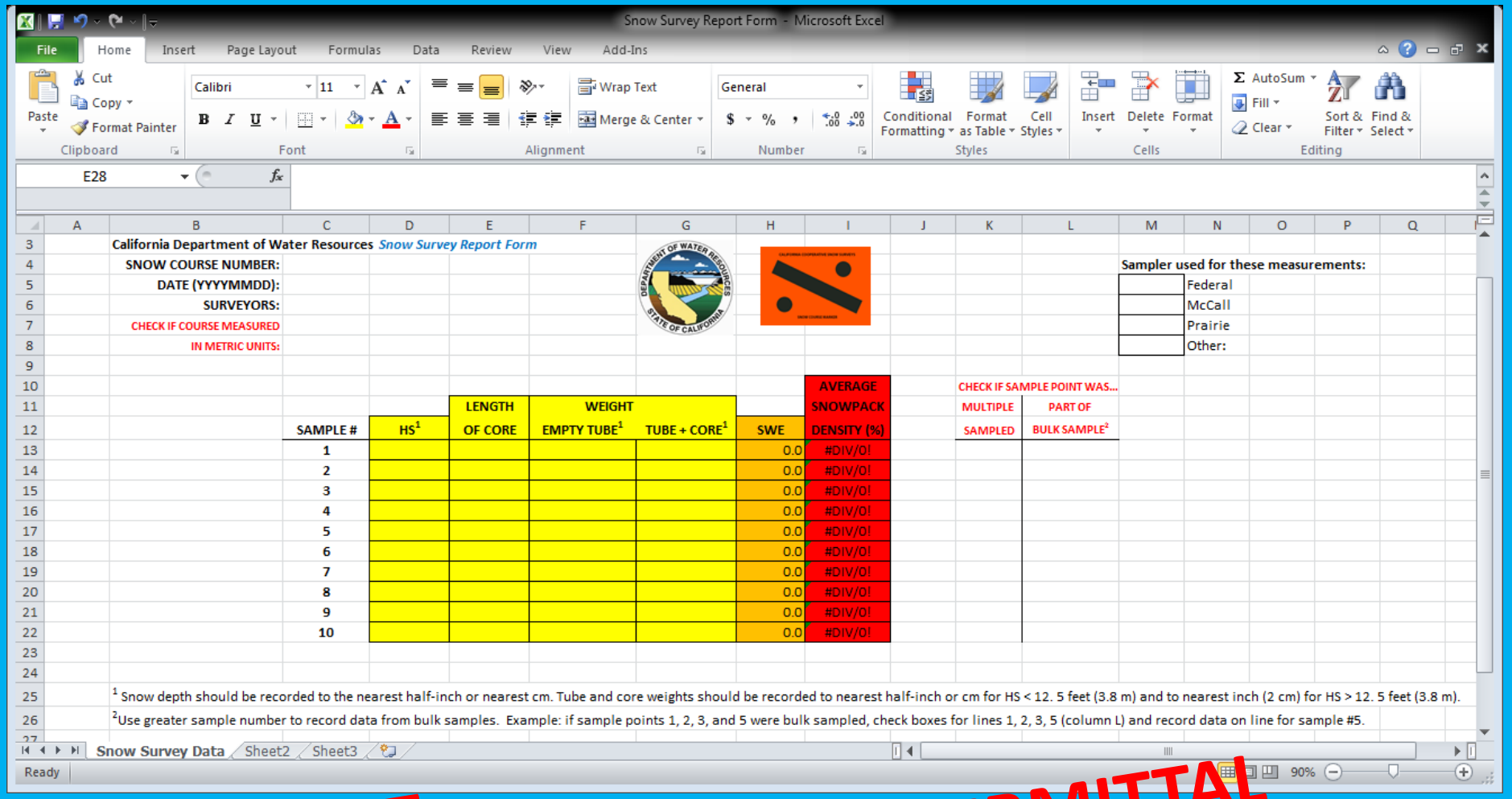

Snow Survey Report Form - Microsoft Excel

File | Home | Insert | Page Layout | Formulas | Data | Review | View | Add-Ins

Cut | Copy | Format Painter | Paste | Clipboard
Calibri | 11 | Font
Wrap Text | Merge & Center | Alignment
General | Number
Conditional Formatting | Format as Table | Cell Styles | Styles
Insert | Delete | Format | Cells
AutoSum | Fill | Clear | Sort & Filter | Find & Select | Editing

E28

California Department of Water Resources *Snow Survey Report Form*

SNOW COURSE NUMBER:
DATE (YYYYMMDD):
SURVEYORS:
CHECK IF COURSE MEASURED
IN METRIC UNITS:

Sampler used for these measurements:

	Federal
	McCall
	Prairie
	Other:

SAMPLE #	HS[1]	LENGTH OF CORE	WEIGHT EMPTY TUBE[1]	WEIGHT TUBE + CORE[1]	SWE	AVERAGE SNOWPACK DENSITY (%)	CHECK IF SAMPLE POINT WAS... MULTIPLE SAMPLED	PART OF BULK SAMPLE[2]
1					0.0	#DIV/0!		
2					0.0	#DIV/0!		
3					0.0	#DIV/0!		
4					0.0	#DIV/0!		
5					0.0	#DIV/0!		
6					0.0	#DIV/0!		
7					0.0	#DIV/0!		
8					0.0	#DIV/0!		
9					0.0	#DIV/0!		
10					0.0	#DIV/0!		

[1] Snow depth should be recorded to the nearest half-inch or nearest cm. Tube and core weights should be recorded to nearest half-inch or cm for HS < 12. 5 feet (3.8 m) and to nearest inch (2 cm) for HS > 12. 5 feet (3.8 m).

[2] Use greater sample number to record data from bulk samples. Example: if sample points 1, 2, 3, and 5 were bulk sampled, check boxes for lines 1, 2, 3, 5 (column L) and record data on line for sample #5.

Snow Survey Data | Sheet2 | Sheet3

Ready | 90%

DRAFT
SNOW SURVEY DATA SUBMITTAL

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THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
CALIFORNIA COOPERATIVE SNOW SURVEYS
SNOW SURVEY NOTES

DRAINAGE BASIN _____

SNOW COURSE _____ COURSE NO. _____

SURVEYORS _____

DATE _____ UNITS: INCHES CM

DISTANCE BETWEEN POINTS	SAMPLE #	HS	CORE LENGTH	TARE WEIGHT	WEIGHT TUBE + CORE	SWE	DENSITY %	REMARKS (OVER)

NO. ____ OF ____ SHEETS. COMPL BY ____ CHECKED BY ____

PLEASE COMPLETE THE FOLLOWING OBSERVATIONS WHILE IN THE FIELD.
CIRCLE ALL THAT APPLY.

CLEAR P. CLOUDY OVERCAST RAIN SNOW BLOWING SNOW FREEZING
THAWING SLEET HAIL THUNDER/LIGHTNING RIME FOG

SNOW SAMPLES OBTAINED WITH:
EASE MODERATE DIFFICULTY* GREAT DIFFICULTY*

SNOW SURFACE: SUPPORTABLE WET RAIN RUNNELED HOAR GLASSY

GROUND UNDER SNOW: FROZEN DRY DAMP WET

SNOW IS MELTING ON: N and/or E SLOPES S and/or W SLOPES

EVIDENCE OF RECENT AVALANCHES: YES* NO

SMALL STREAMS ARE: RUNNING FROZEN PARTIALLY FROZEN CLEAR
MUDDY BRIDGED BY SNOW

***REMARKS:**

DRAFT
NEW SNOW SURVEY NOTE

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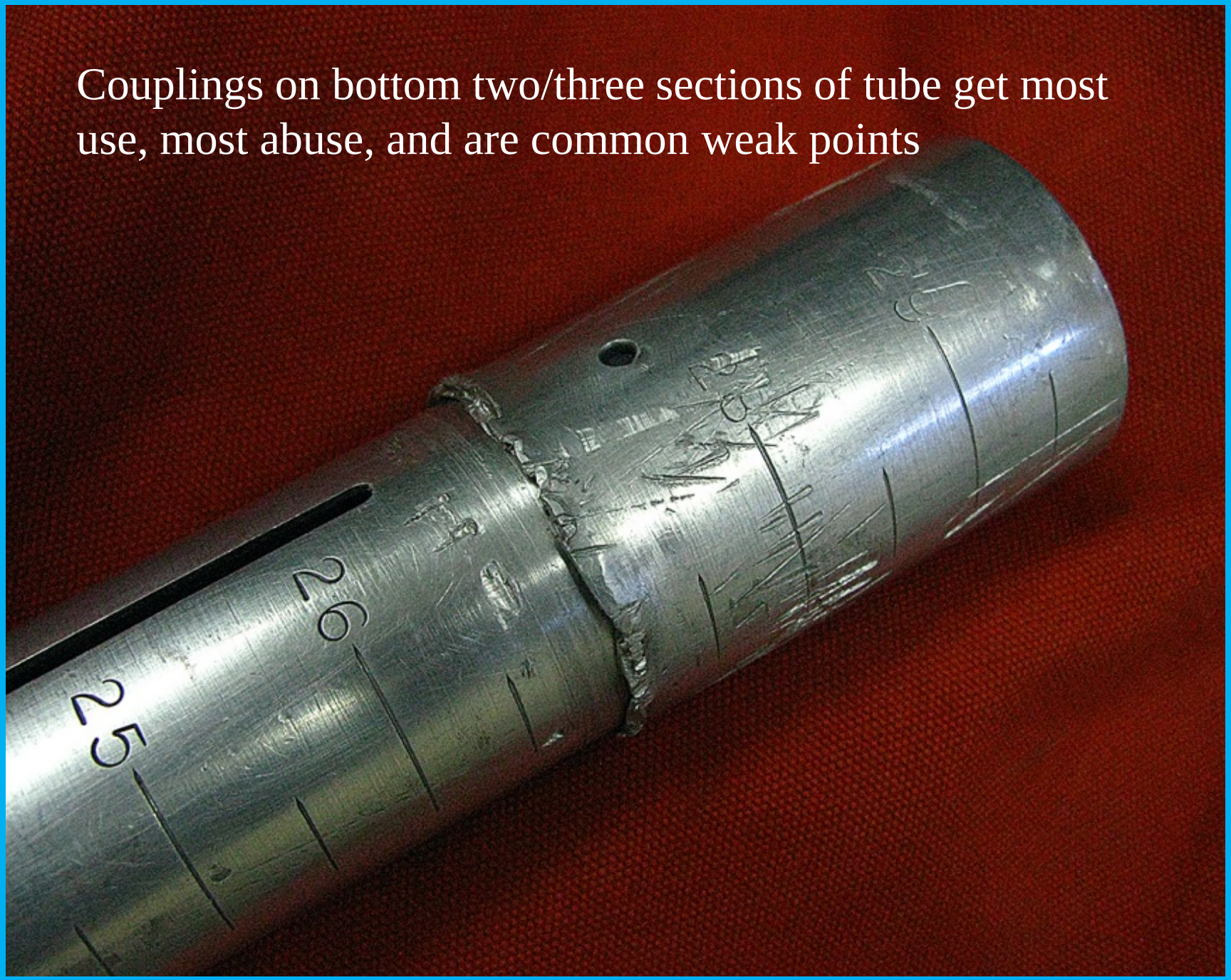
Couplings on bottom two/three sections of tube get most use, most abuse, and are common weak points



Seamless, continuous (billit) milled coupling from Hansen Machine, Sacramento

I need lots of feedback from snow surveyors: techniques, equipment, anecdotes

Thank you!

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