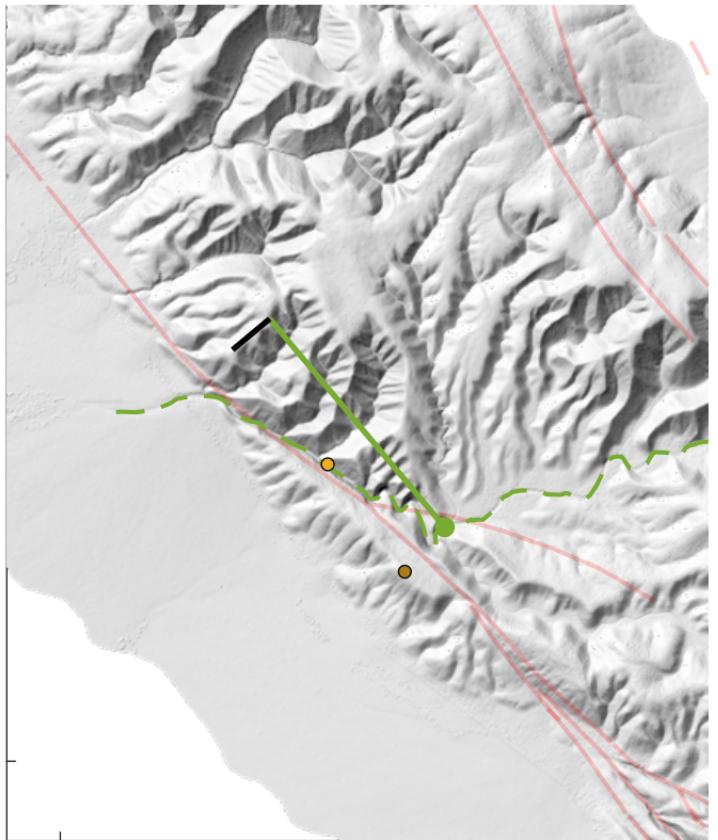


Figures S6-S64 Annotated channel measurements with hillshade. Digitized channels shown in dashed lines. Each set of measurements represents our preferred interpretation. Note that the categorization of active, incipient/recent avulsion, and abandoned are indicated by color-coding the offsets green, yellow and red respectively. Note that the upstream reach is measured in a straight path from the avulsion node to the start of the channel (typically out of frame). We indicate channels that, while initially considered were rejected upon more careful consideration because either 1) offsets were too small (if any) and too subtle to confidently attribute a measurement (Fig. S20 and S24) or 2) the avulsion occurred away from the avulsion node (Fig. S40-41) such that Eq. 3-4, which characterize aggradation rate at the avulsion node, do not apply. It is our interpretation that the latter case occurs when there are major changes in fault kinematics along strike, suppressing an avulsion at the upstream bend and promoting avulsion further downstream. These are not used to validate the model framework and do not feature in Figures 2-3, however, these are nonetheless instructive and motivate the conceptual framework depicted in Figure 4.

3884200



263400

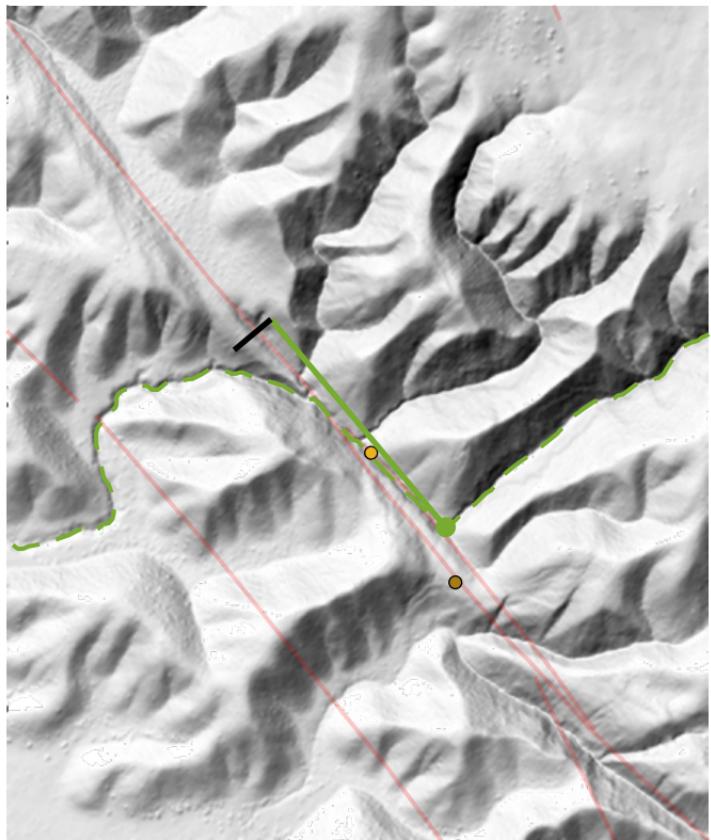
264400

NAD27 UTM 11N

Figure S6
Channel #1: active

- Quaternary faults
- $z_1 = 665 \text{ m}$
- $z_2 = 690 \text{ m}$
- $h_c = z_2 - z_1 = 35 \text{ m}$
- Upstream reach: 947 m
- $S_0 : 0.03$
- Offset: 450 m
- Avulsion node

3881400



3880950

265950

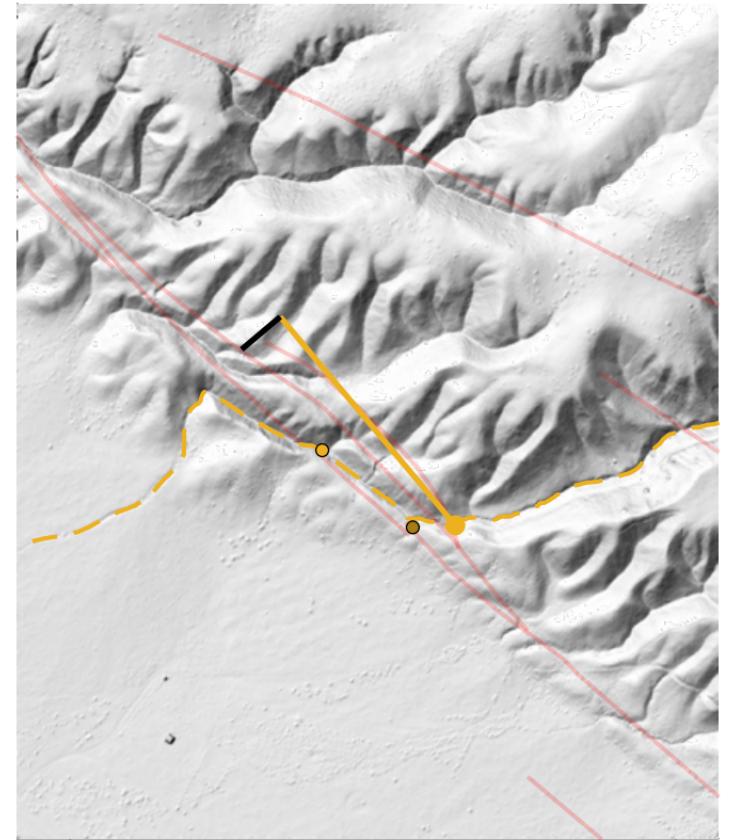
NAD27 UTM 11N

Figure S7
Channel #2: active

- Quaternary faults
- $z_1 = 724 \text{ m}$
- $z_2 = 734 \text{ m}$
- $h_c = z_2 - z_1 = 10 \text{ m}$
- Upstream reach: 461 m
- $S_0 : 0.11$
- Offset: 170 m
- Avulsion node

3879800

3879000

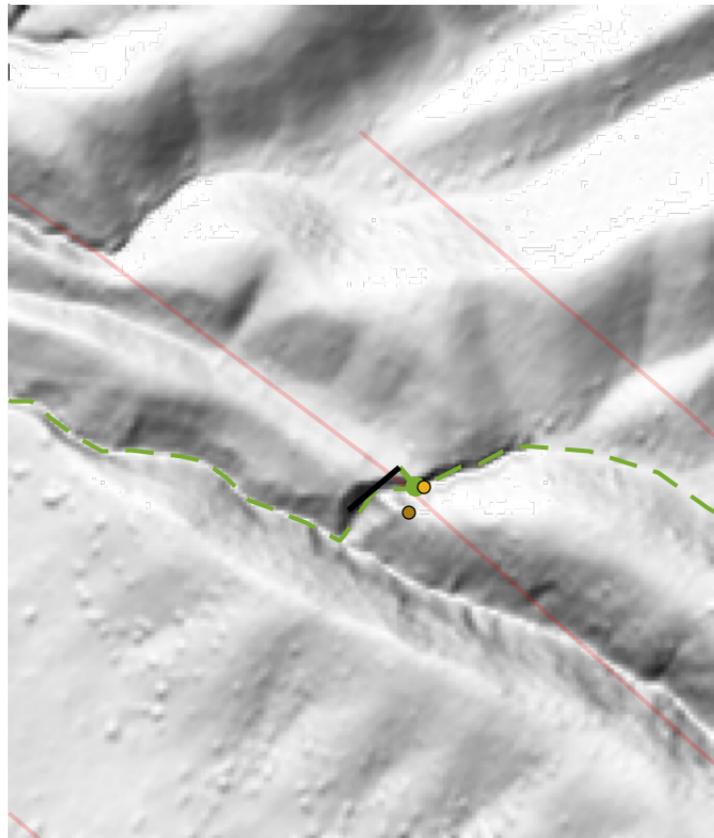


NAD27 UTM 11N

Figure S8
Channel #3: active

- Quaternary faults
- $z_1 = 760 \text{ m}$
- $z_2 = 767 \text{ m}$
- $h_c = z_2 - z_1 = 7 \text{ m}$
- Upstream reach: 523 m
- - - $S_0 : 0.07$
- Offset: 270 m
- Avulsion node

3878980

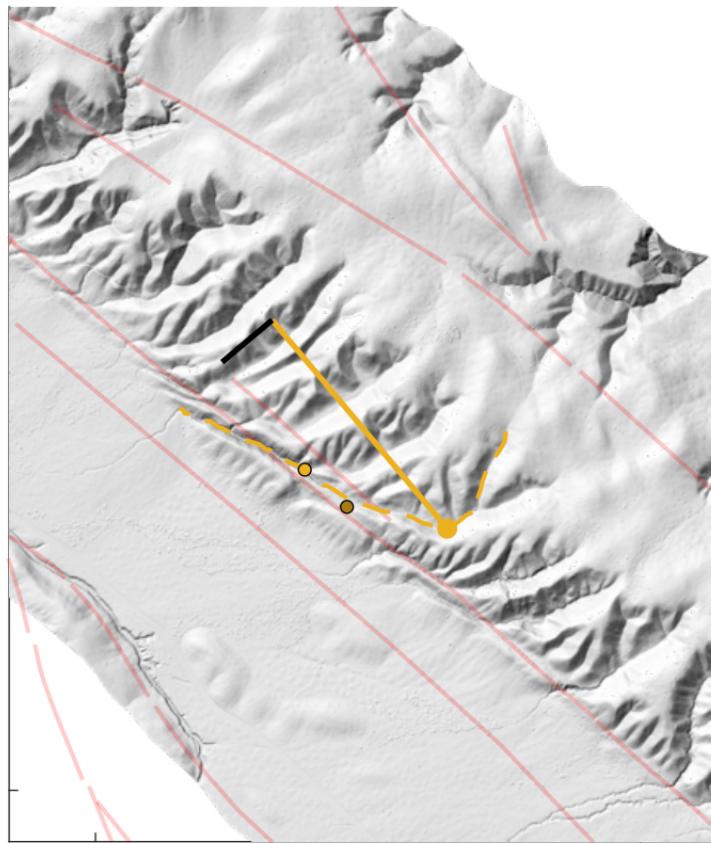


NAD27 UTM 11N

Figure S9
Channel #4: active

- Quaternary faults
- $z_1 = 781 \text{ m}$
- $z_2 = 785 \text{ m}$
- $h_c = z_2 - z_1 = 4 \text{ m}$
- Upstream reach: 323 m
- $S_0 : 0.12$
- Offset: 6 m
- Avulsion node

3879600



268400

269400

NAD27 UTM 11N

Figure S10
Channel #5: active

- Quaternary faults
- $z_1 = 798 \text{ m}$
- $z_2 = 787 \text{ m}$
- $h_c = z_2 - z_1 = 11 \text{ m}$
- Upstream reach: 222 m
- $S_0: 0.08$
- Offset: 500 m
- Avulsion node

3878850

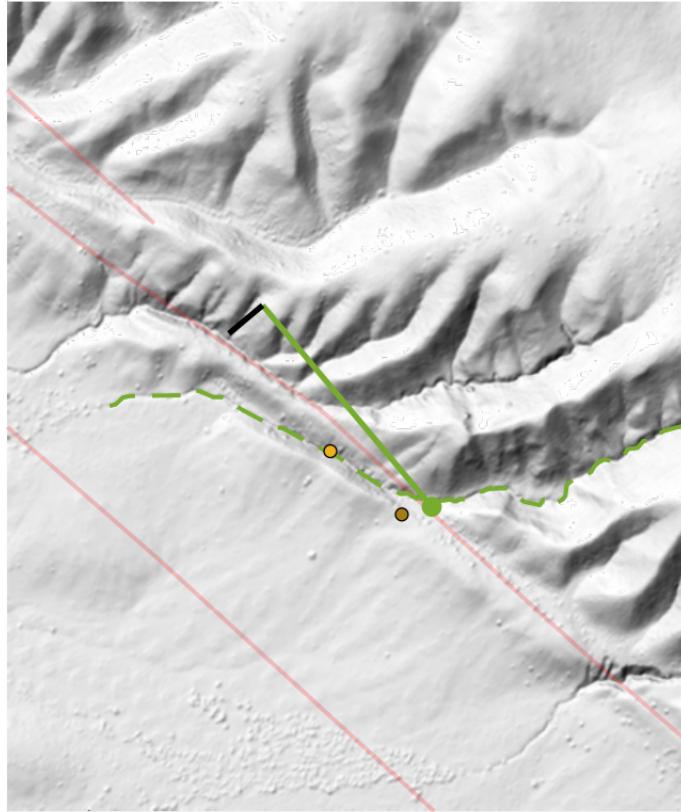


NAD27 UTM 11N

Figure S11
Channel #6: active

- Quaternary faults
- $z_1 = 793 \text{ m}$
- $z_2 = 802 \text{ m}$
- $h_c = z_2 - z_1 = 9 \text{ m}$
- Upstream reach: 212 m
- $S_0: 0.09$
- Offset: 170 m
- Avulsion node

3878800



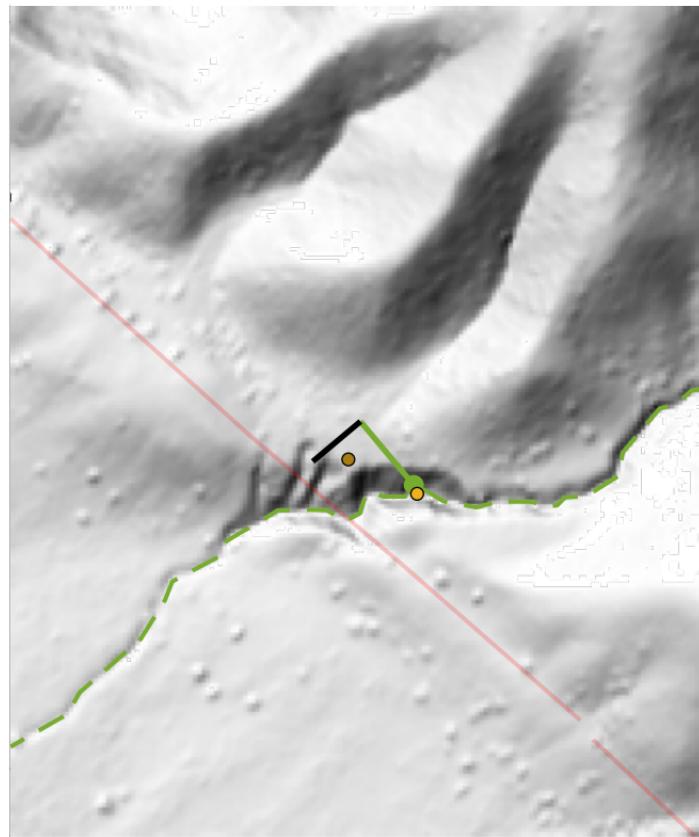
268900

NAD27 UTM 11N

Figure S12
Channel #7: active

- Quaternary faults
- $z_1 = 793$ m
- $z_2 = 801$ m
- $h_c = z_2 - z_1 = 7$ m
- Upstream reach: 247 m
- $S_0 : 0.065$
- Offset: 180 m
- Avulsion node

3878500



269180

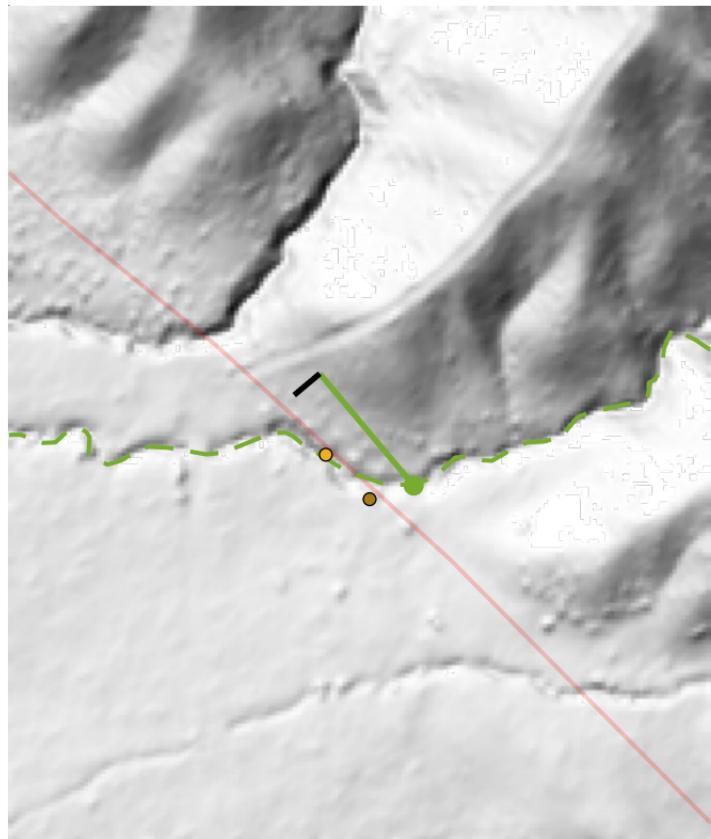
269340

NAD27 UTM 11N

Figure S13
Channel #8: active

- Quaternary faults
- $z_1 = 806 \text{ m}$
- $z_2 = 810 \text{ m}$
- $h_c = z_2 - z_1 = 4 \text{ m}$
- Upstream reach: 271 m
- $S_0: 0.09$
- Offset: 20 m
- Avulsion node

3878280



269420

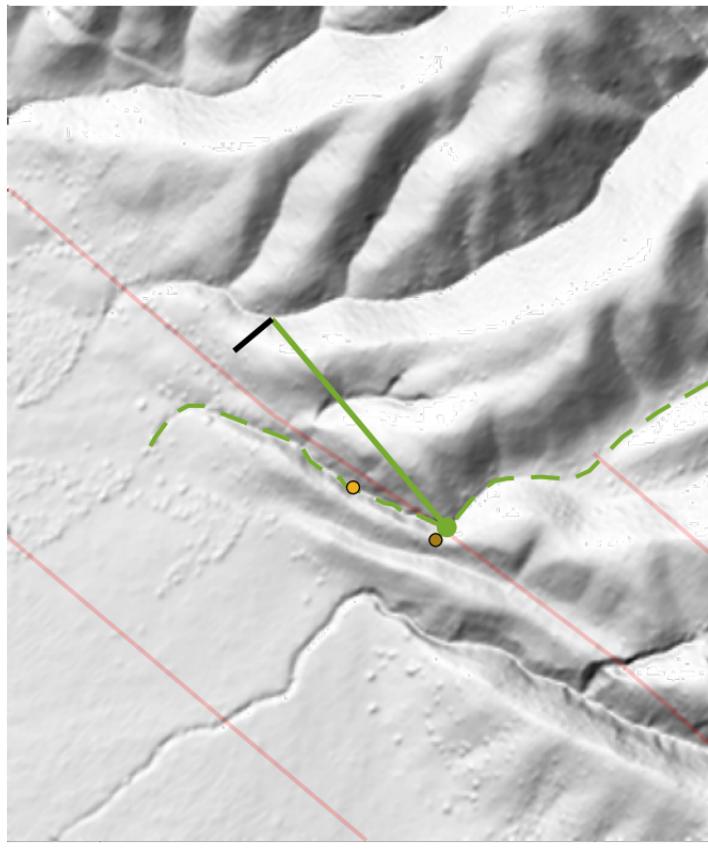
269560

NAD27 UTM 11N

Figure S14
Channel #9: active

- Quaternary faults
- $z_1 = 809 \text{ m}$
- $z_2 = 811 \text{ m}$
- $h_c = z_2 - z_1 = 2 \text{ m}$
- Upstream reach: 372 m
- $S_0: 0.07$
- Offset: 35 m
- Avulsion node

3879100
3878800



268450 268650
NAD27 UTM 11N

Figure S15
Channel #10: active

- Quaternary faults
- $z_1 = 775 \text{ m}$
- $z_2 = 780 \text{ m}$
- $h_c = z_2 - z_1 = 5 \text{ m}$
- Upstream reach: 362 m
- - - $S_0: 0.1$
- Offset: 110 m
- Avulsion node

3879120

3878940

268380

268540

NAD27 UTM 11N

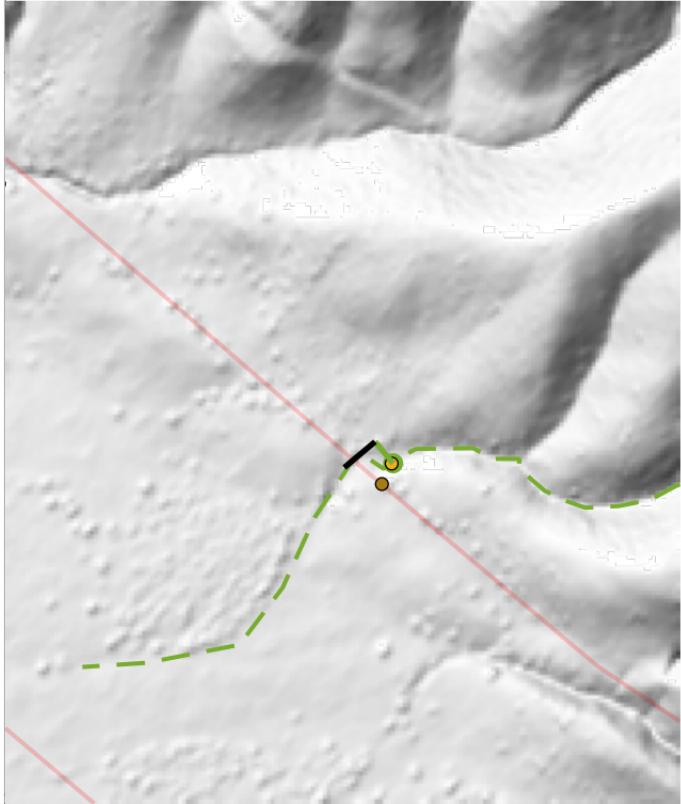


Figure S16
Channel #11: active

- Quaternary faults
- $z_1 = 770 \text{ m}$
- $z_2 = 771.5 \text{ m}$
- $h_c = z_2 - z_1 = 1.5 \text{ m}$
- Upstream reach: 392 m
- - - $S_0: 0.09$
- Offset: 7 m
- Avulsion node

3885540

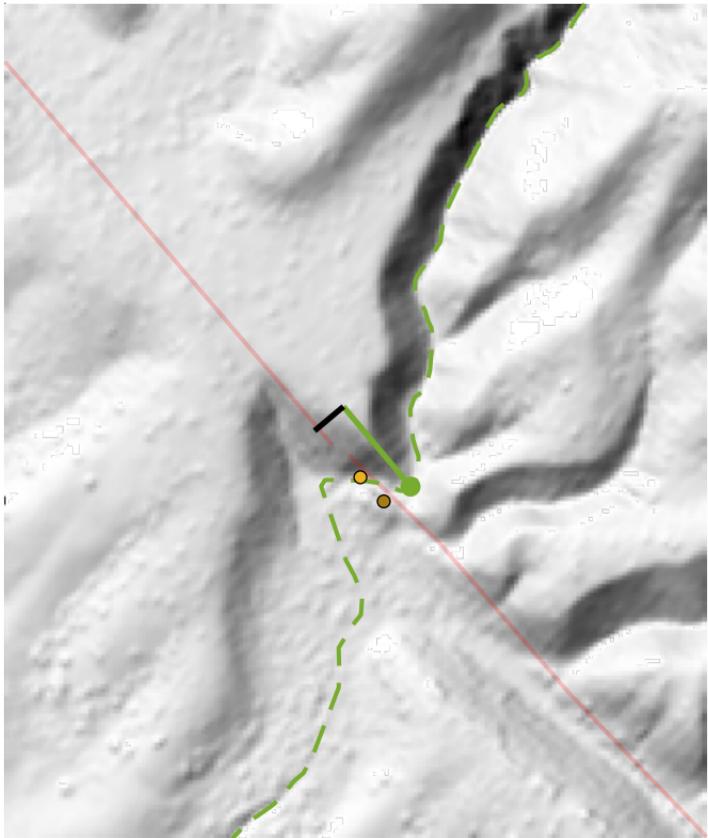


Figure S17
Channel #12: active

- Quaternary faults
- $z_1 = 636.2$ m
- $z_2 = 637.4$ m
- $h_c = z_2 - z_1 = 1.2$ m
- Upstream reach: 500 m
- $S_0: 0.05$
- Offset: 25 m
- Avulsion node

3885360

261880

262020

NAD27 UTM 11N

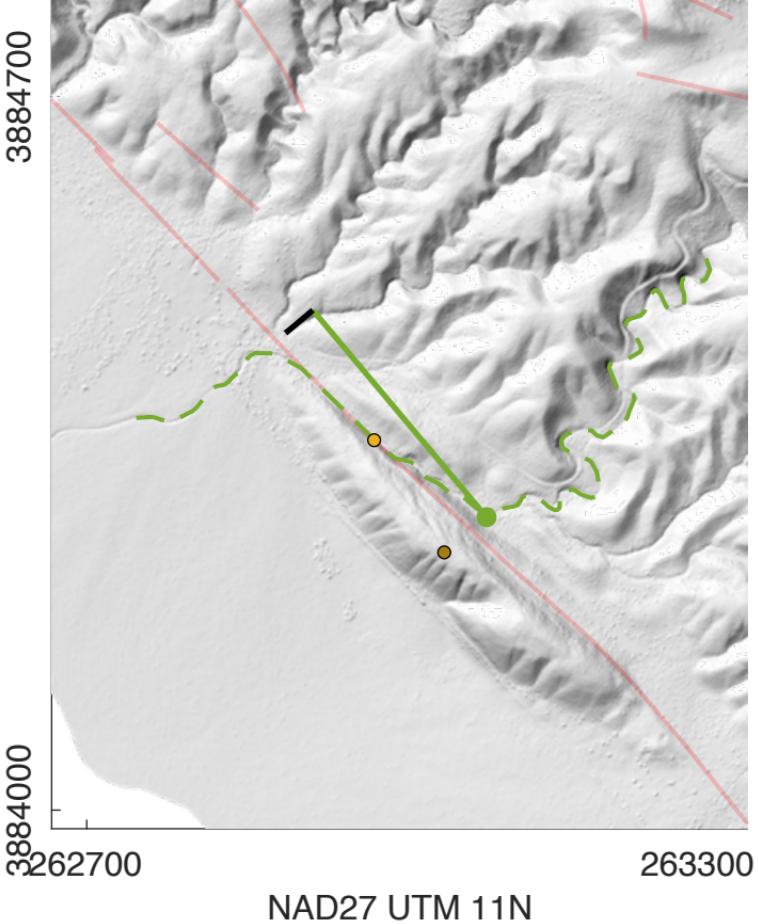
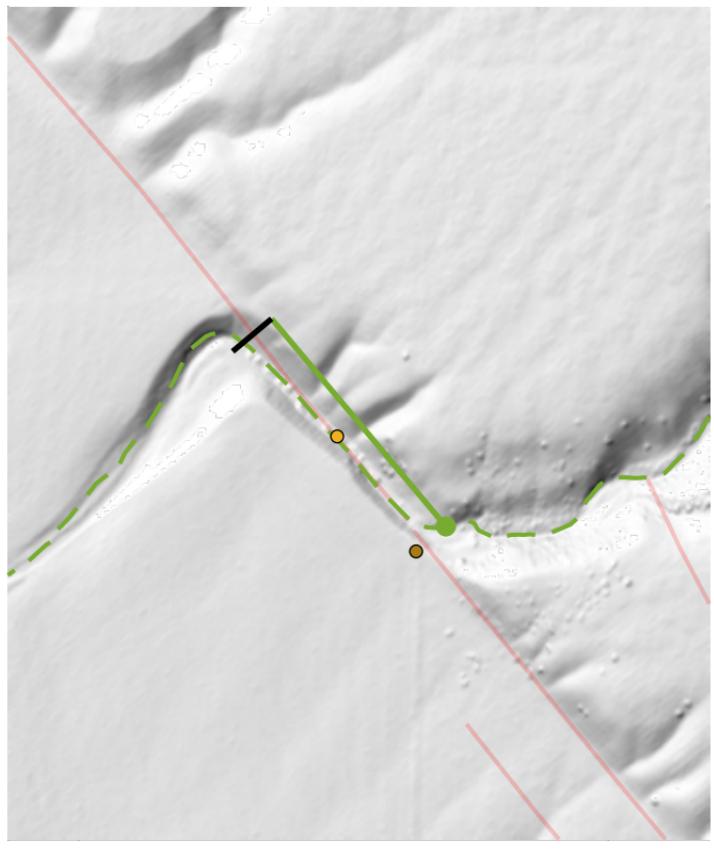


Figure S18
Channel #13: active

- Quaternary faults
- $z_1 = 645 \text{ m}$
- $z_2 = 665 \text{ m}$
- $h_c = z_2 - z_1 = 20 \text{ m}$
- Upstream reach: 5675 m
- $S_0 : 0.03$
- Offset: 265 m
- Avulsion node

3906800



3906450

242750

243000

NAD27 UTM 11N

Figure S19
Channel #14: active

- Quaternary faults
- $z_1 = 645 \text{ m}$
- $z_2 = 658.5 \text{ m}$
- $h_c = z_2 - z_1 = 4.5 \text{ m}$
- Upstream reach: 4400 m
- $S_0: 0.033$
- Offset: 128 m
- Avulsion node

3906260

Rejected

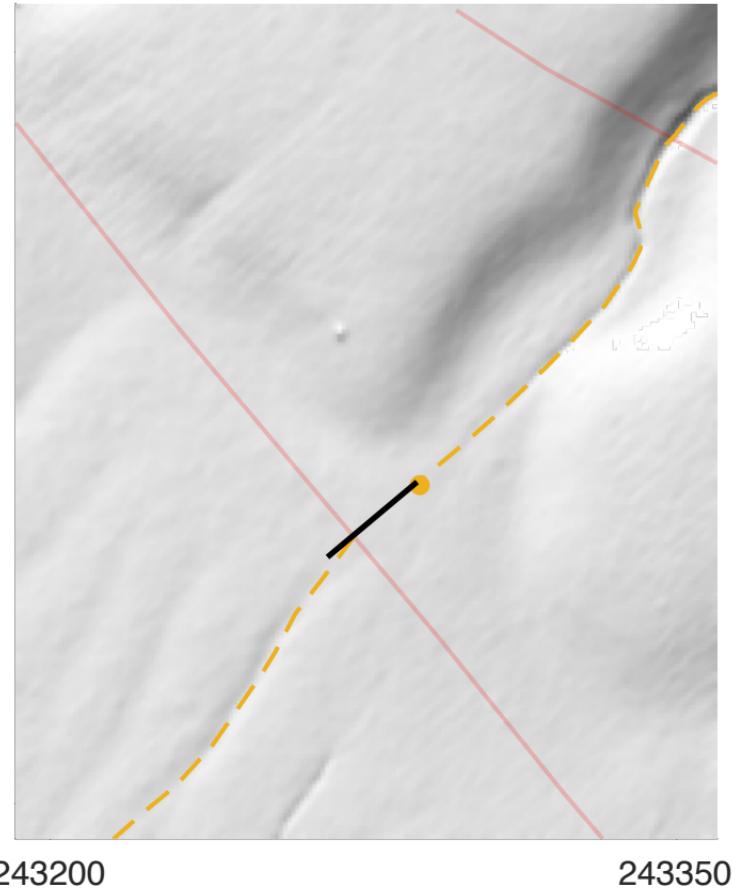


Figure S20
Channel #15: active

- Quaternary faults
- $z_1 = \text{NaN m}$
- $z_2 = \text{NaN m}$
- $h_c = z_2 - z_1 = 0.3 \text{ m}$
- Upstream reach: 669 m
- $S_0 : 0.07$
- Offset: 1 m
- Avulsion node

3905360

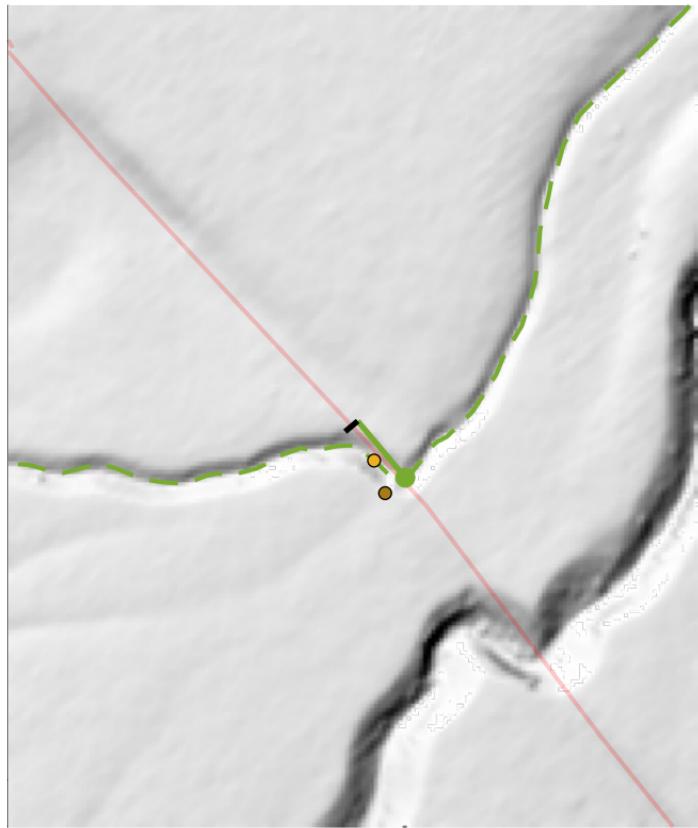


Figure S21
Channel #16: active

- Quaternary faults
- $z_1 = 644 \text{ m}$
- $z_2 = 646 \text{ m}$
- $h_c = z_2 - z_1 = 2 \text{ m}$
- Upstream reach: 2039 m
- $S_0 : 0.036$
- Offset: 18 m
- Avulsion node

NAD27 UTM 11N

3905320

3905140

243940

244100

NAD27 UTM 11N

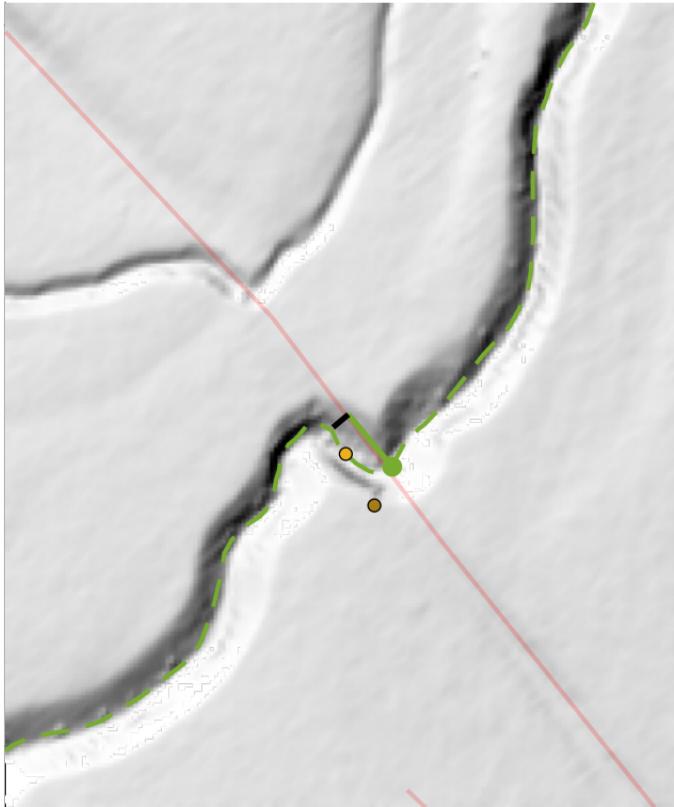


Figure S22
Channel #17: active

Quaternary faults

$z_1 = 640 \text{ m}$

$z_2 = 645.5 \text{ m}$

$h_c = z_2 - z_1 = 5.5 \text{ m}$

Upstream reach: 3138 m

$S_0 : 0.035$

Offset: 17 m

Avulsion node

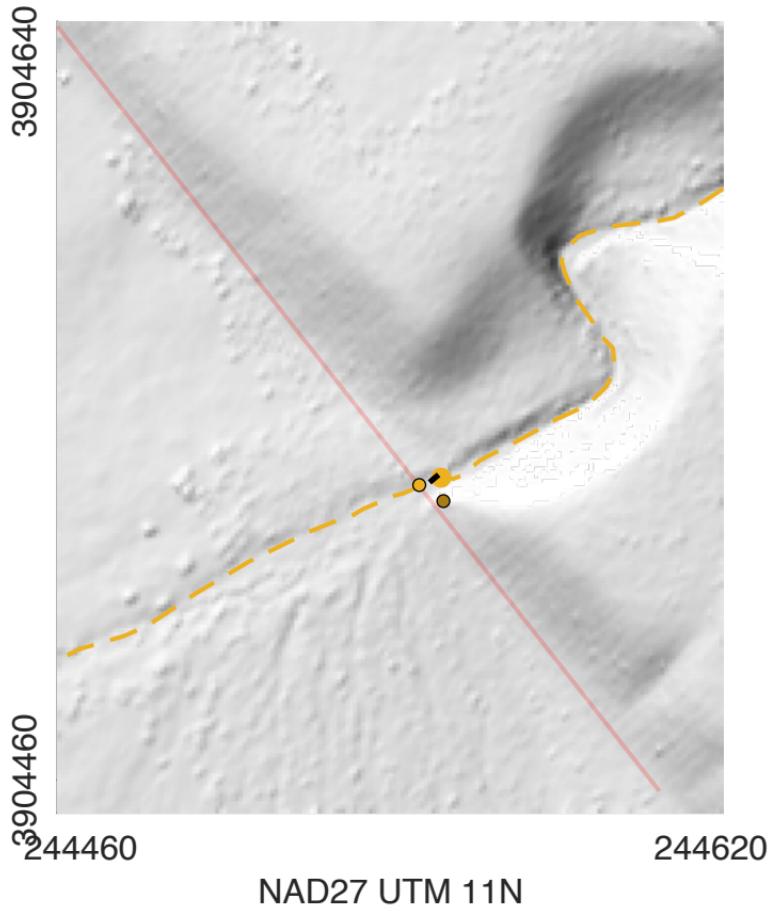


Figure S23
Channel #18: active

- Quaternary faults
- $z_1 = 639.4 \text{ m}$
- $z_2 = 640.1 \text{ m}$
- $h_c = z_2 - z_1 = 0.7 \text{ m}$
- Upstream reach: 5500 m
- $S_0 : 0.035$
- Offset: 1 m
- Avulsion node

Rejected

3904240

3904060

2444780

244920

NAD27 UTM 11N

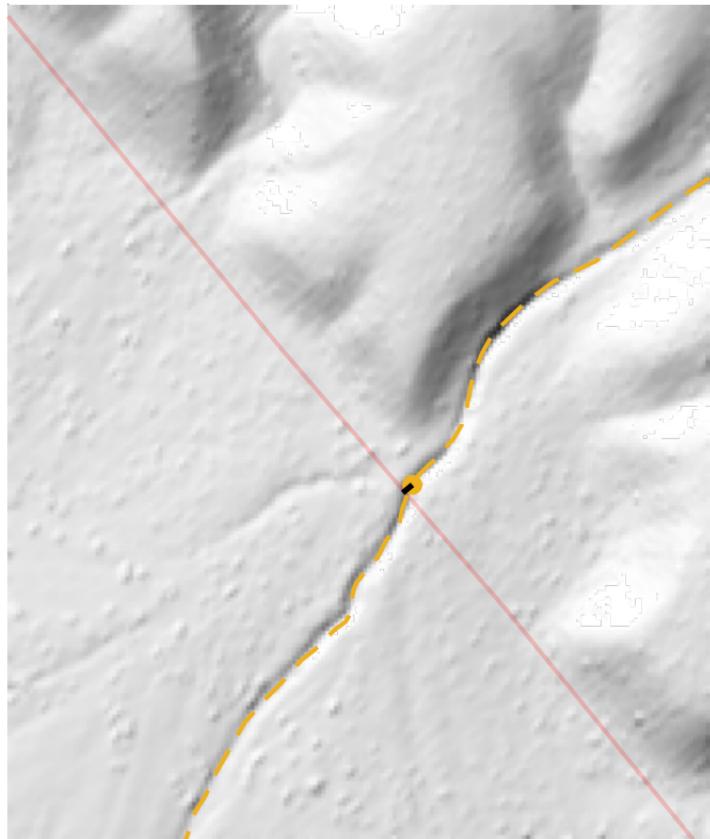


Figure S24
Channel #19: active

- Quaternary faults
- $z_1 = \text{NaN m}$
- $z_2 = \text{NaN m}$
- $h_c = z_2 - z_1 = 1.5 \text{ m}$
- Upstream reach: 5701 m
- $S_0: 0.038$
- Offset: 0 m
- Avulsion node

3902500

3902320

246220

246380

NAD27 UTM 11N



Figure S25
Channel #20: active

- Quaternary faults
- $z_1 = 609.5$ m
- $z_2 = 612$ m
- $h_c = z_2 - z_1 = 2.5$ m
- Upstream reach: 1710 m
- $S_0 : 0.022$
- Offset: 21 m
- Avulsion node

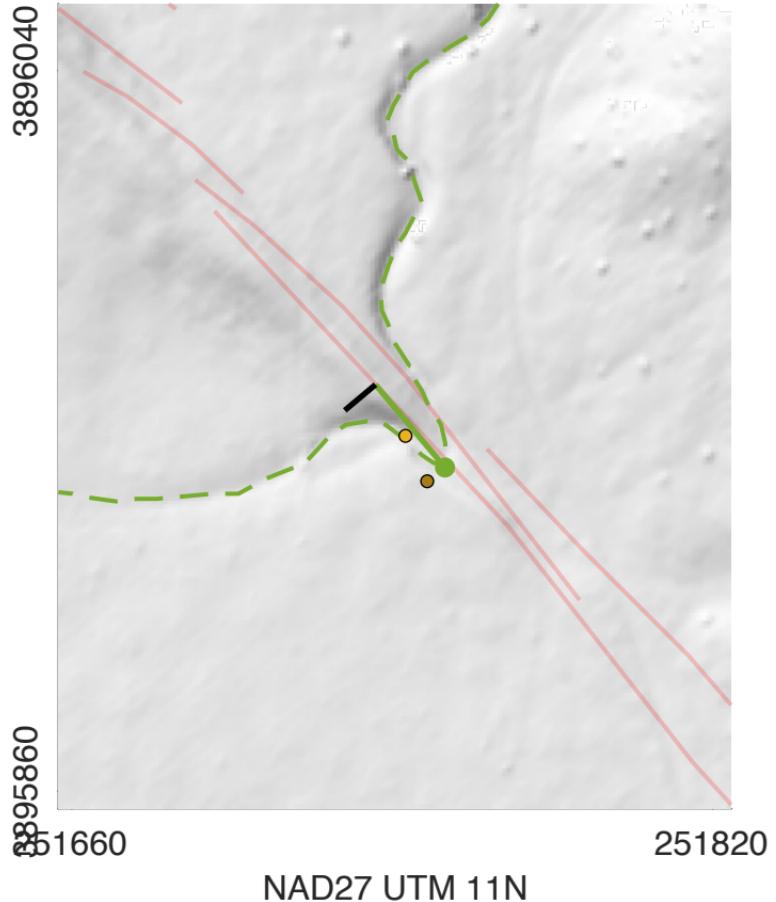


Figure S26
Channel #21: active

Quaternary faults

$z_1 = 618.9 \text{ m}$

$z_2 = 620.2 \text{ m}$

$h_c = z_2 - z_1 = 1.3 \text{ m}$

Upstream reach: 1314 m

$S_0 : 0.026$

Offset: 27 m

Avulsion node

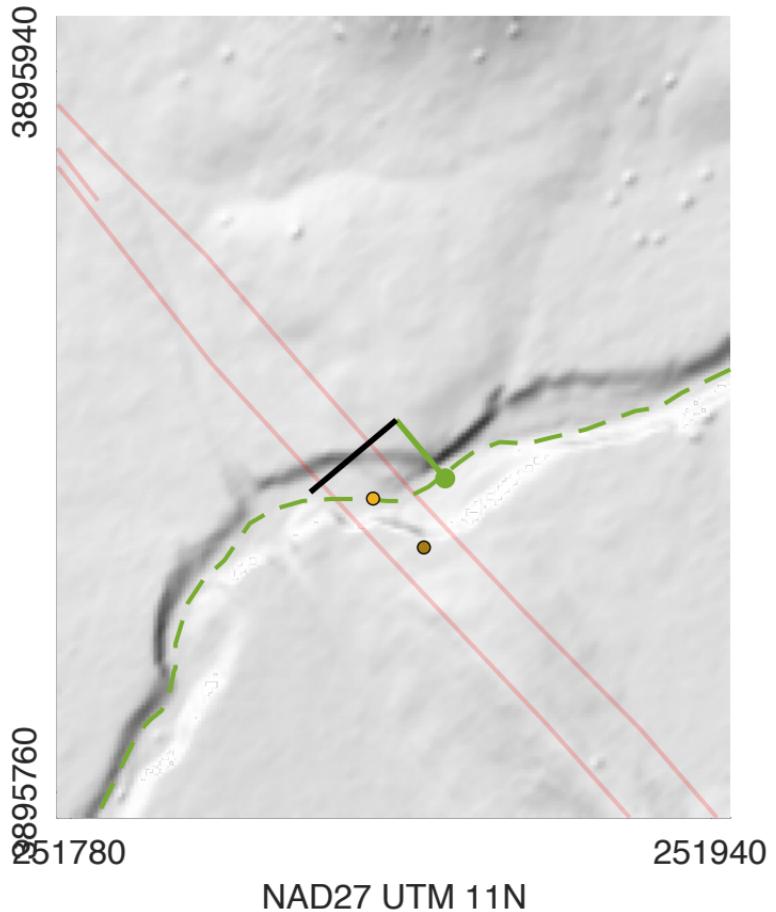
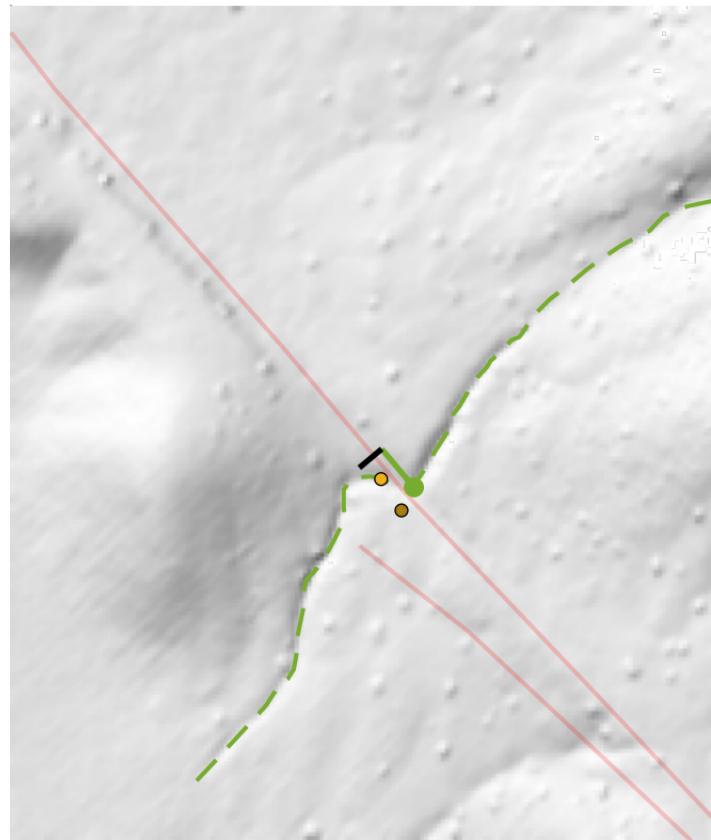


Figure S27
Channel #22: active

- Quaternary faults
- $z_1 = 621 \text{ m}$
- $z_2 = 625 \text{ m}$
- $h_c = z_2 - z_1 = 4 \text{ m}$
- Upstream reach: 4681 m
- $S_0 : 0.028$
- Offset: 19 m
- Avulsion node

3895140



252480

252620

NAD27 UTM 11N

Figure S28
Channel #23: active

- Quaternary faults
- $z_1 = 622 \text{ m}$
- $z_2 = 623.4 \text{ m}$
- $h_c = z_2 - z_1 = 1.4 \text{ m}$
- Upstream reach: 227 m
- $S_0: 0.07$
- Offset: 12 m
- Avulsion node

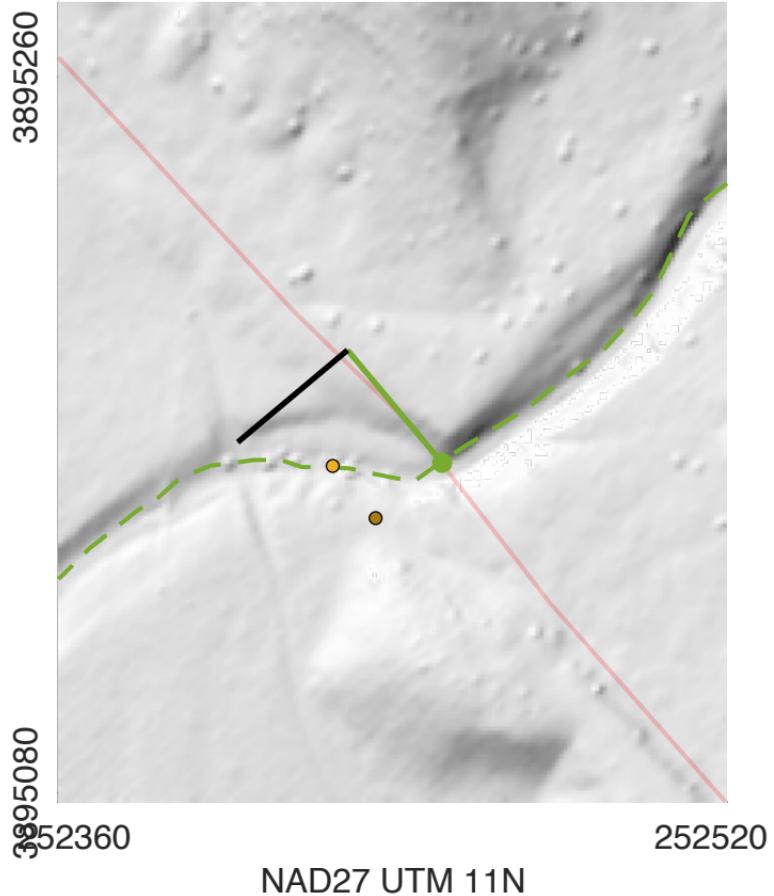
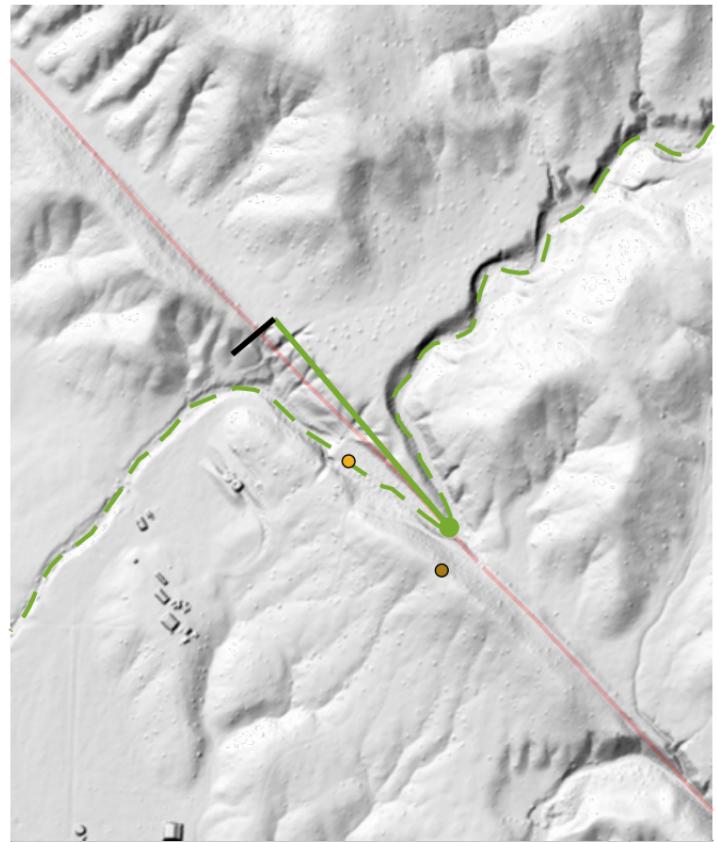


Figure S29
Channel #24: active

Quaternary faults
$z_1 = 618.6 \text{ m}$
$z_2 = 620.7 \text{ m}$
$h_c = z_2 - z_1 = 2.1 \text{ m}$
Upstream reach: 4698 m
$S_0 : 0.024$
Offset: 37 m
Avulsion node

3894500



253100

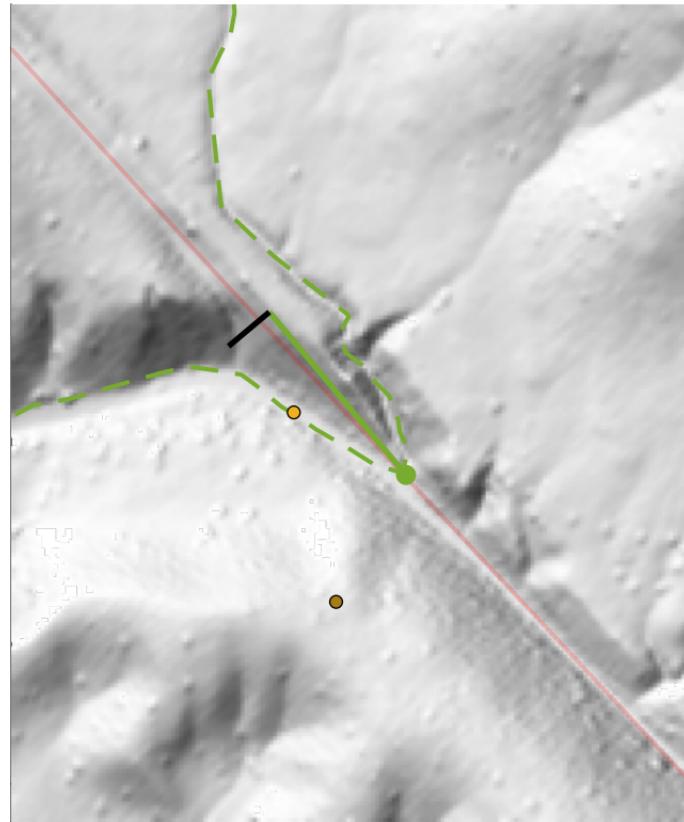
253600

NAD27 UTM 11N

Figure S30
Channel #25: active

- Quaternary faults
- $z_1 = 615 \text{ m}$
- $z_2 = 629 \text{ m}$
- $h_c = z_2 - z_1 = 14.4 \text{ m}$
- Upstream reach: 2845 m
- $S_0 : 0.028$
- Offset: 248 m
- Avulsion node

3893960



3893780

253560

253720

NAD27 UTM 11N

Figure S31
Channel #26: active

- Quaternary faults
- $z_1 = 602.5 \text{ m}$
- $z_2 = 617.1 \text{ m}$
- $h_c = z_2 - z_1 = 15.6 \text{ m}$
- Upstream reach: 415 m
- $S_0: 0.055$
- Offset: 52 m
- Avulsion node

3894100



3893500

253500

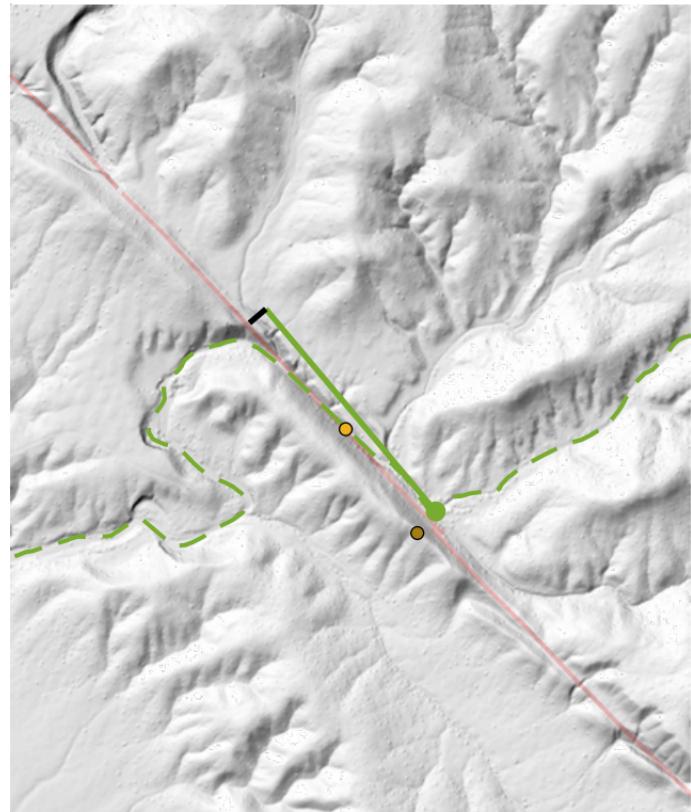
253900

NAD27 UTM 11N

Figure S32
Channel #27: active

- Quaternary faults
- $z_1 = 604 \text{ m}$
- $z_2 = 624 \text{ m}$
- $h_c = z_2 - z_1 = 20 \text{ m}$
- Upstream reach: 1285 m
- $S_0: 0.024$
- Offset: 220 m
- Avulsion node

3894200



253400

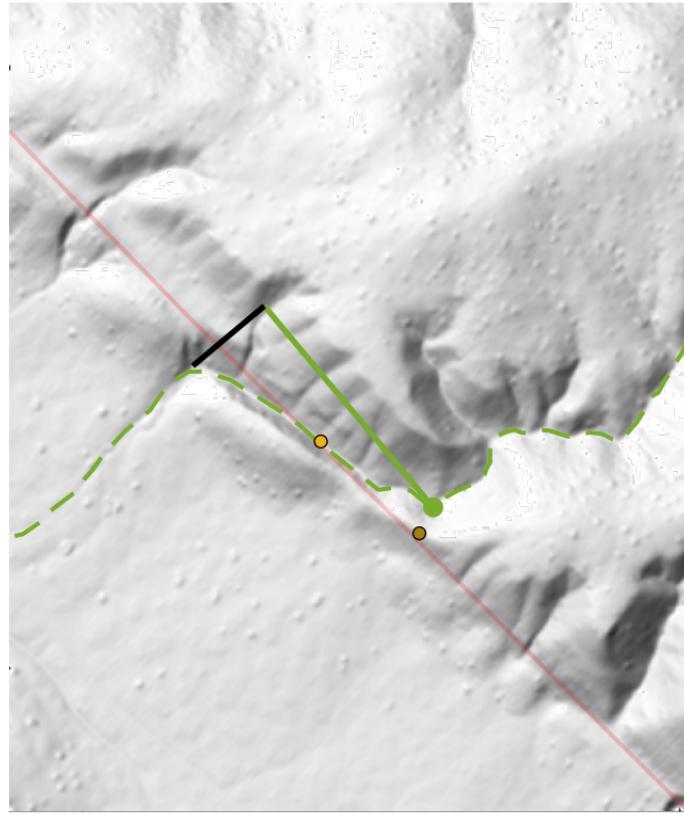
254100

NAD27 UTM 11N

Figure S33
Channel #28: active

- Quaternary faults
- $z_1 = 605 \text{ m}$
- $z_2 = 624 \text{ m}$
- $h_c = z_2 - z_1 = 19 \text{ m}$
- Upstream reach: 1839 m
- - - $S_0 : 0.025$
- Offset: 309 m
- Avulsion node

3893550

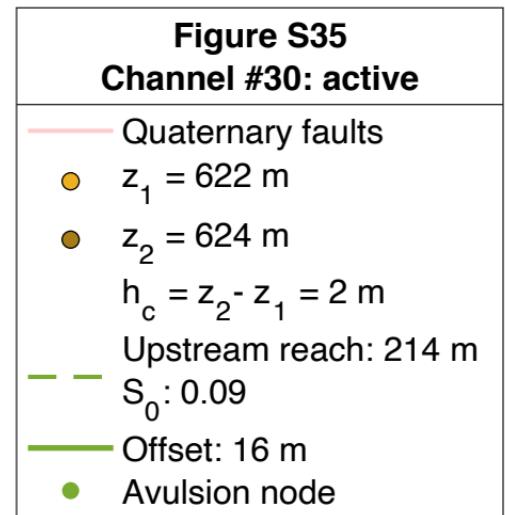
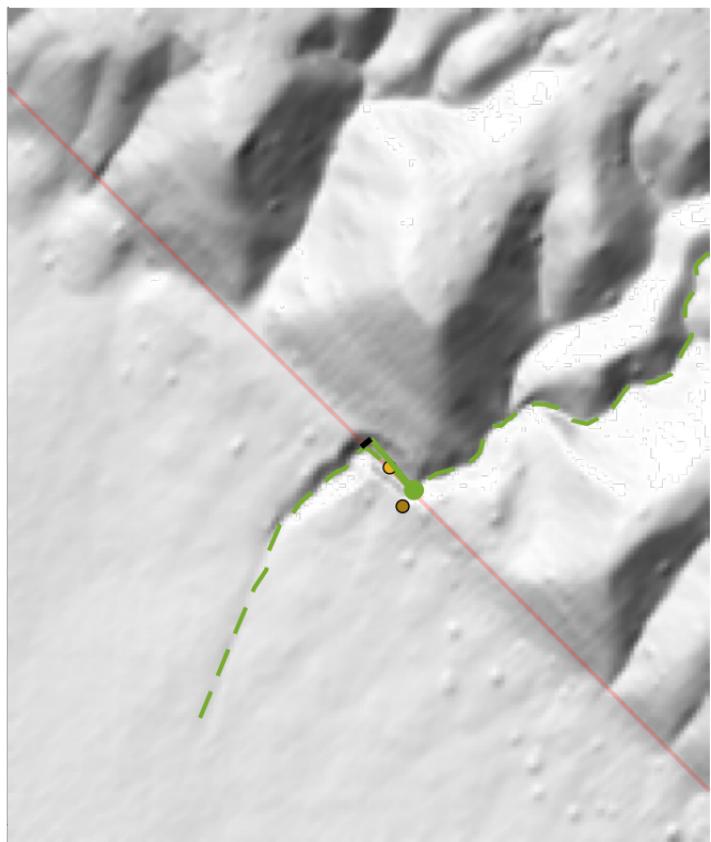


NAD27 UTM 11N

Figure S34
Channel #29: active

- Quaternary faults
- $z_1 = 630 \text{ m}$
- $z_2 = 622 \text{ m}$
- $h_c = z_2 - z_1 = 8 \text{ m}$
- Upstream reach: 285 m
- - - $S_0: 0.07$
- Offset: 110 m
- Avulsion node

3893320



3891800

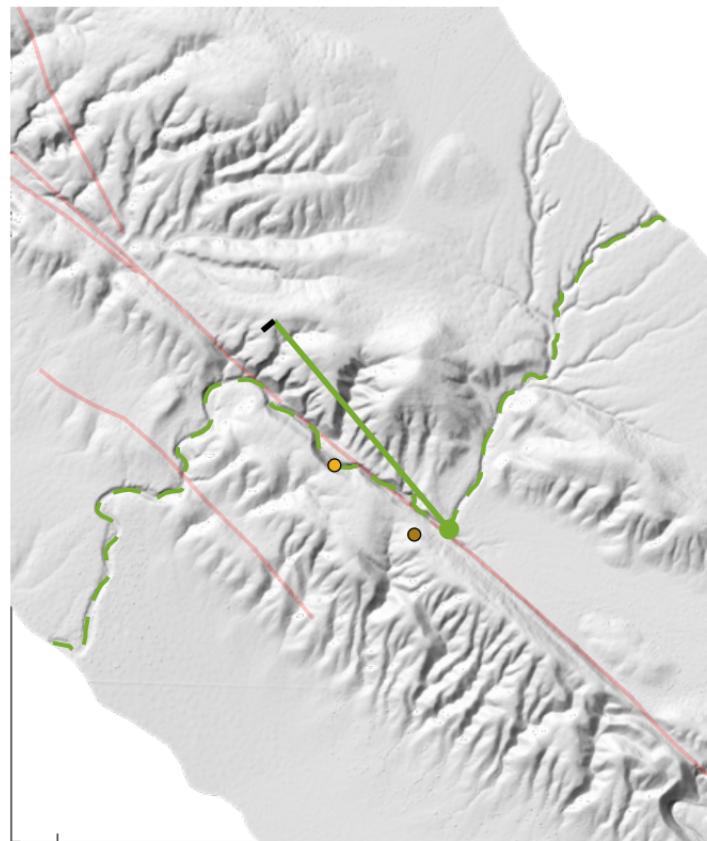


Figure S36
Channel #31: active

- Quaternary faults
- $z_1 = 616 \text{ m}$
- $z_2 = 633 \text{ m}$
- $h_c = z_2 - z_1 = 17 \text{ m}$
- Upstream reach: 5429 m
- $S_0: 0.027$
- Offset: 467 m
- Avulsion node

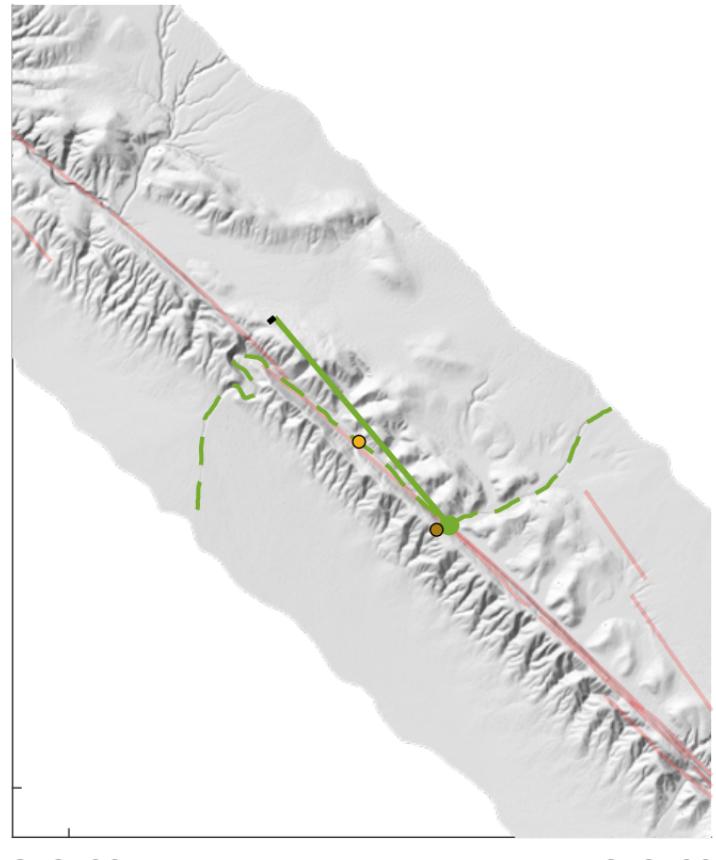
257000

NAD27 UTM 11N

3890400

3891500

3889000



NAD27 UTM 11N

Figure S37
Channel #32: active

- Quaternary faults
- $z_1 = 621\text{ m}$
- $z_2 = 646\text{ m}$
- $h_c = z_2 - z_1 = 25\text{ m}$
- Upstream reach: 5694 m
- $S_0 : 0.021$
- Offset: 919 m
- Avulsion node

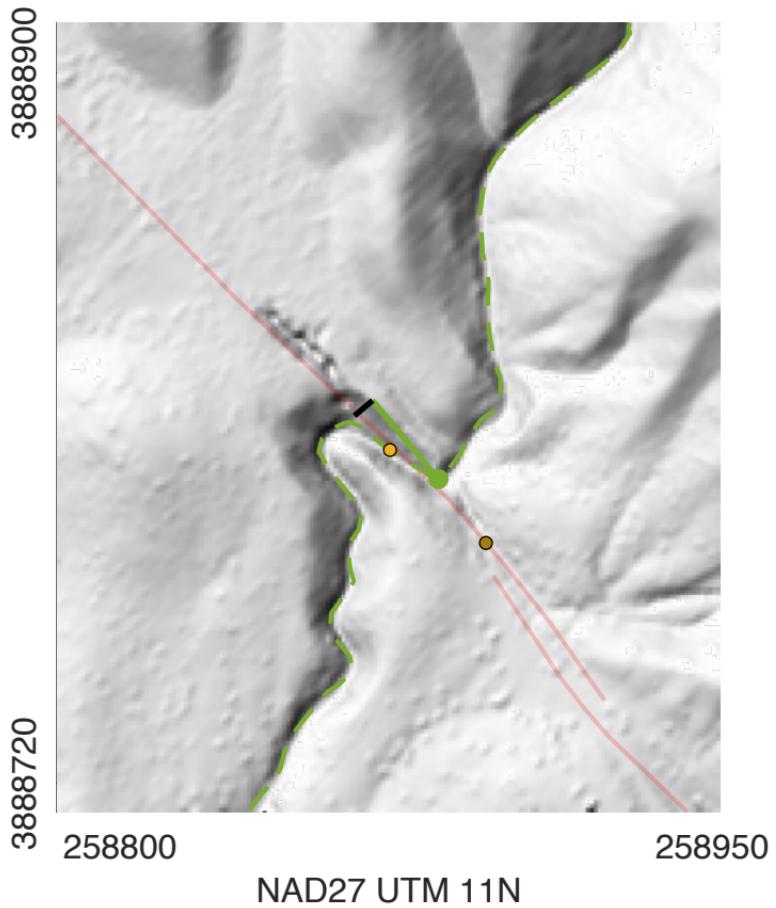
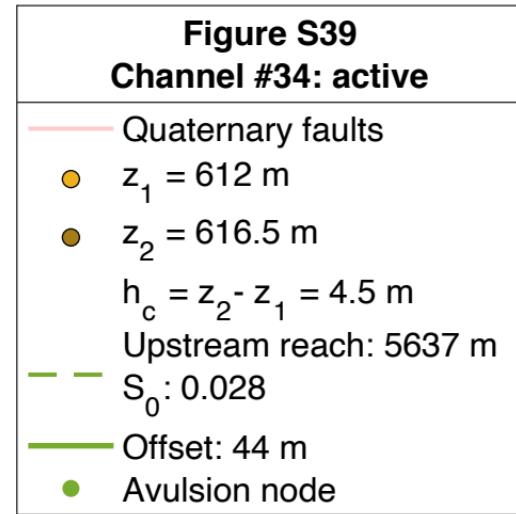
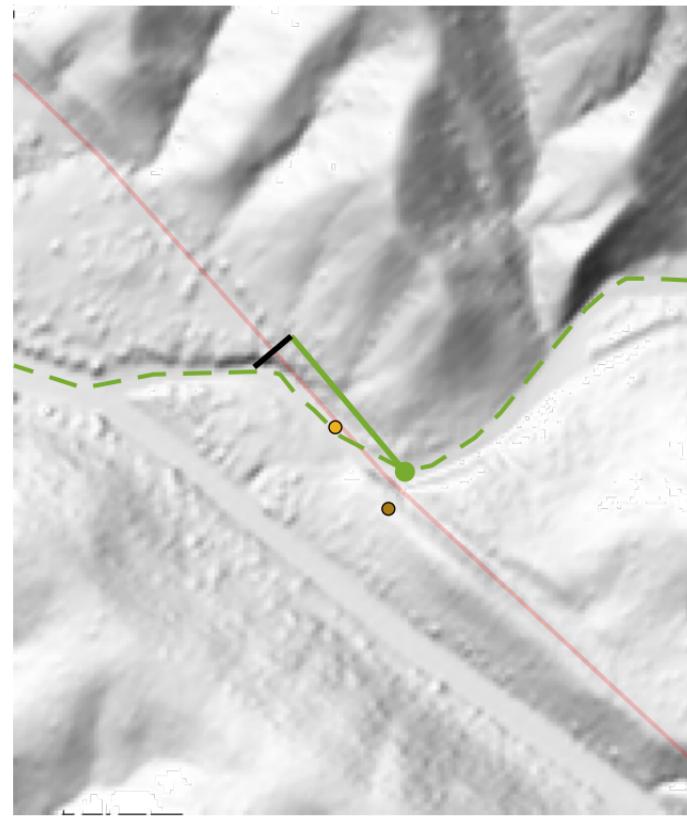


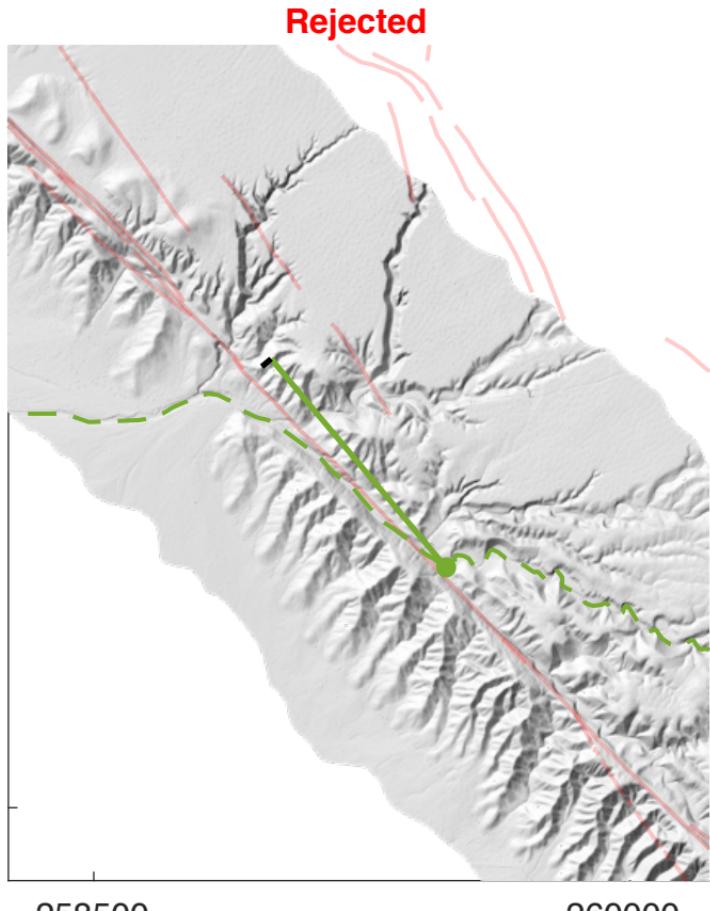
Figure S38
Channel #33: active

- Quaternary faults
- $z_1 = 611 \text{ m}$
- $z_2 = 616 \text{ m}$
- $h_c = z_2 - z_1 = 5 \text{ m}$
- Upstream reach: 1350 m
- $S_0 : 0.04$
- Offset: 26 m
- Avulsion node

3888680



3889500

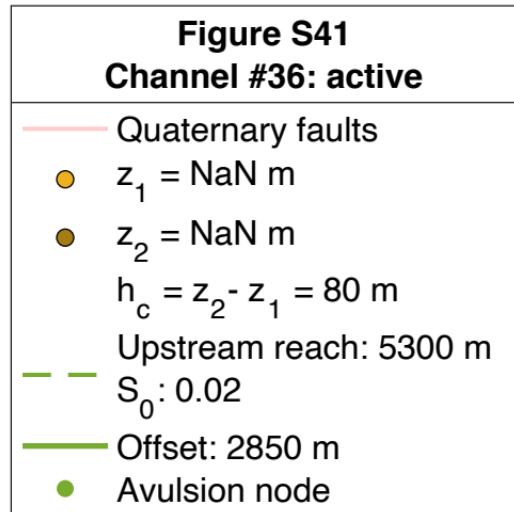
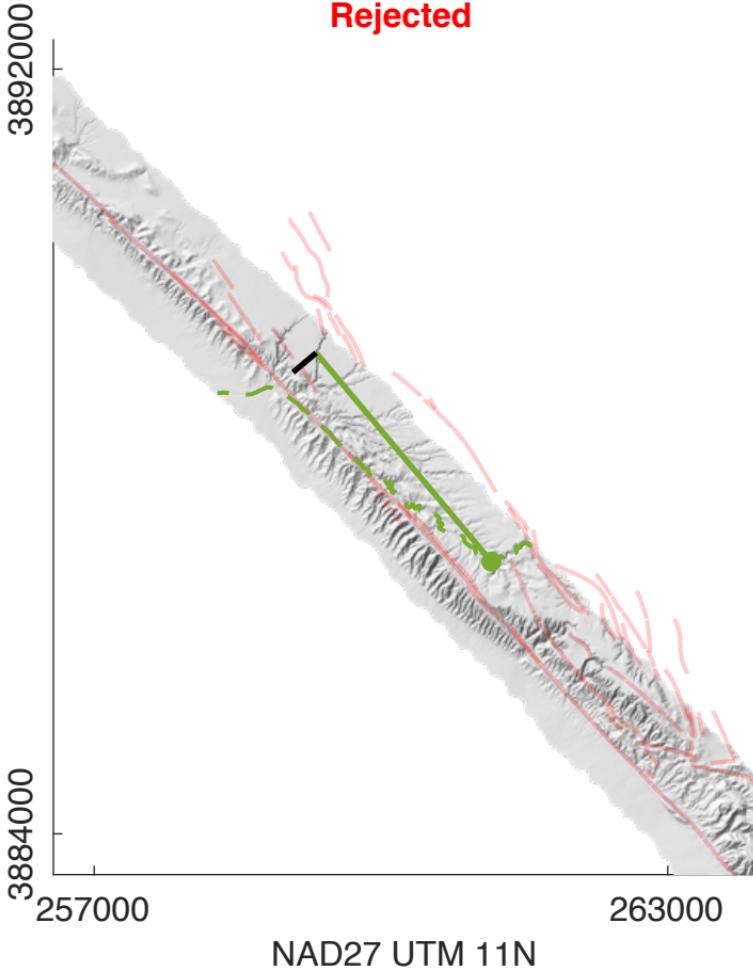


Rejected

NAD27 UTM 11N

Figure S40
Channel #35: active

- Quaternary faults
- $z_1 = \text{NaN m}$
- $z_2 = \text{NaN m}$
- $h_c = z_2 - z_1 = 19 \text{ m}$
- Upstream reach: 4863 m
- $S_0: 0.02$
- Offset: 770 m
- Avulsion node



3886600

3884800

1000

262500

NAD27 UTM 11N

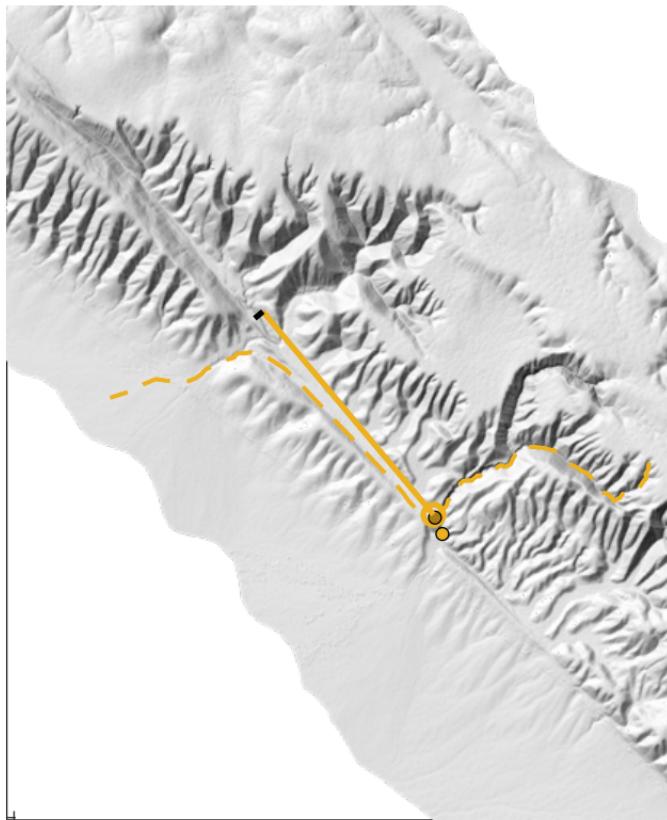
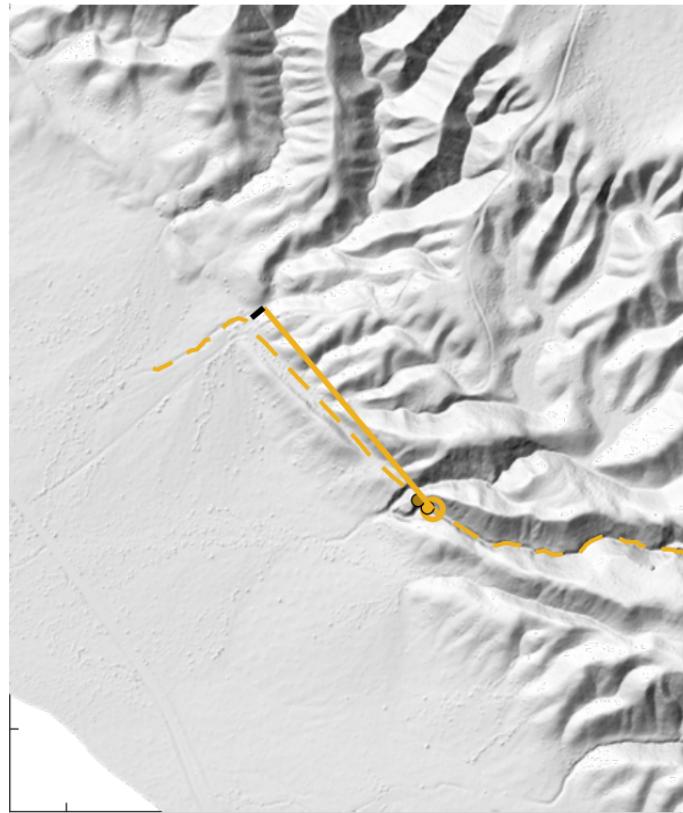


Figure S42
Channel #37: abandoned

- Quaternary faults
- $z_1 = 636 \text{ m}$
- $z_2 = 646.5 \text{ m}$
- $h_c = z_2 - z_1 = 10 \text{ m}$
- Upstream reach: 519 m
- $S_0 : 0.11$
- Offset: 600 m
- Avulsion node

38880600



2666800

267500

NAD27 UTM 11N

Figure S43
Channel #38: abandoned

- Quaternary faults
- $z_1 = 732.5 \text{ m}$
- $z_2 = 739.5 \text{ m}$
- $h_c = z_2 - z_1 = 7 \text{ m}$
- Upstream reach: 902 m
- $S_0: 0.05$
- Offset: 300 m
- Avulsion node

3880400

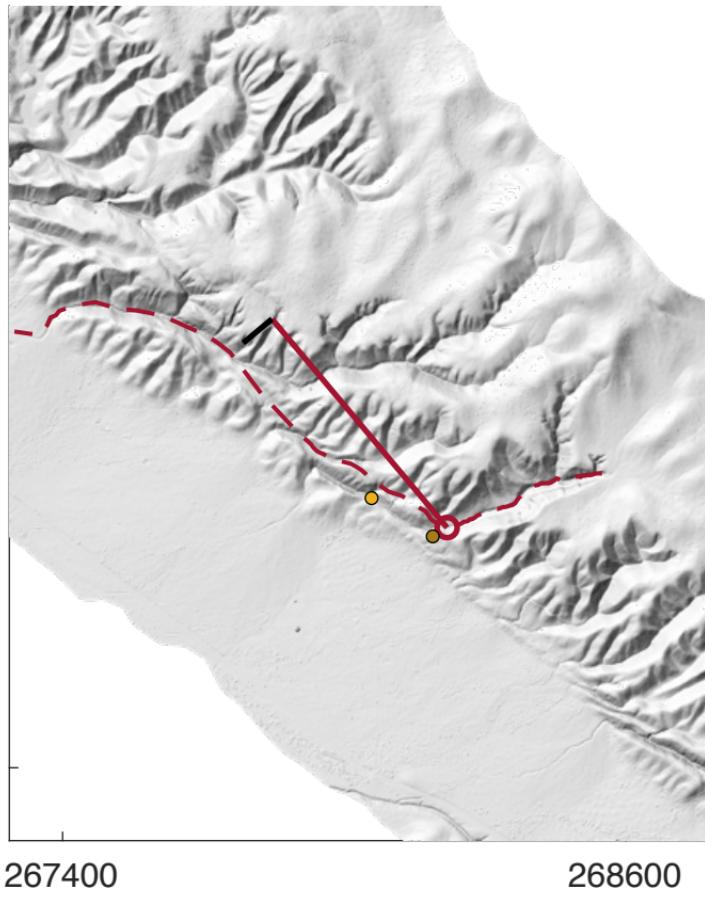


Figure S44
Channel #39: abandoned

- Quaternary faults
- $z_1 = 762 \text{ m}$
- $z_2 = 776 \text{ m}$
- $h_c = z_2 - z_1 = 14 \text{ m}$
- Upstream reach: 517 m
- $S_0: 0.075$
- Offset: 580 m
- Avulsion node

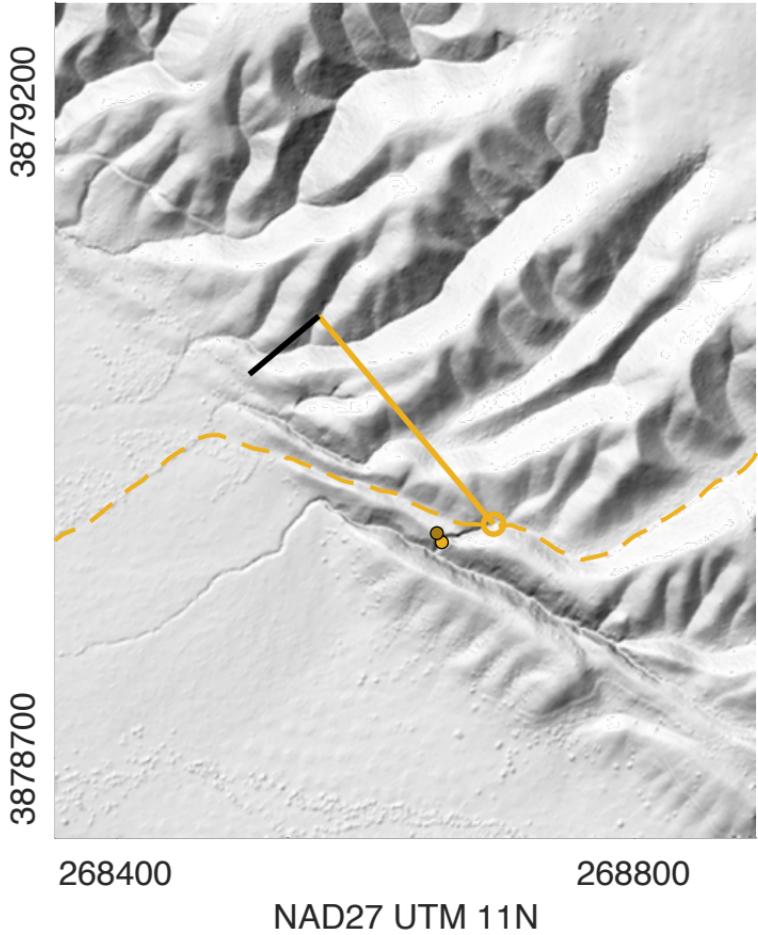
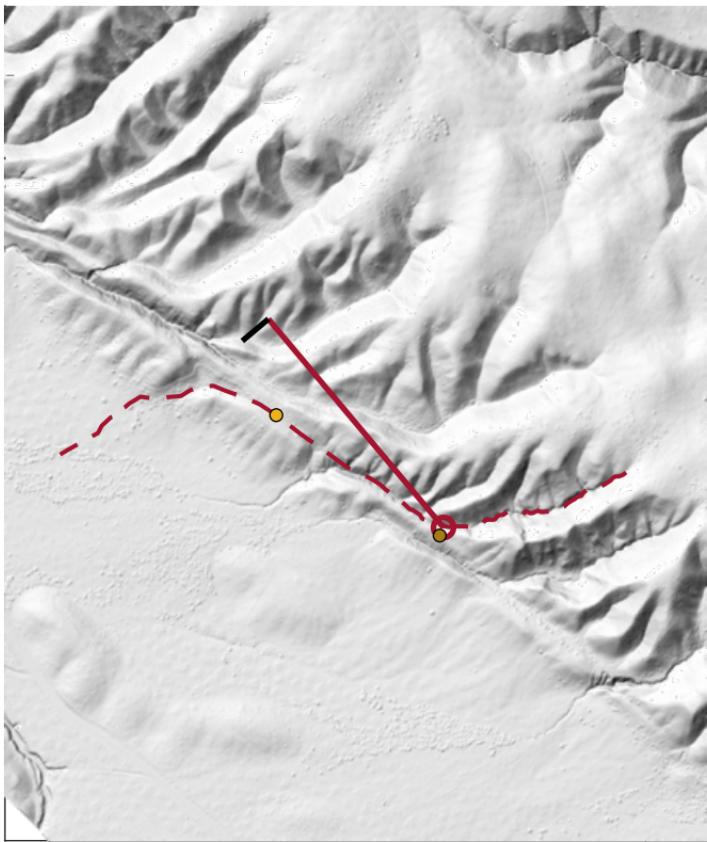


Figure S45
Channel #40: abandoned

- Quaternary faults
- $z_1 = 779.75 \text{ m}$
- $z_2 = 784.5 \text{ m}$
- $h_c = z_2 - z_1 = 4.75 \text{ m}$
- Upstream reach: 320 m
- $S_0: 0.09$
- Offset: 210 m
- Avulsion node

3879100



3878300

268600

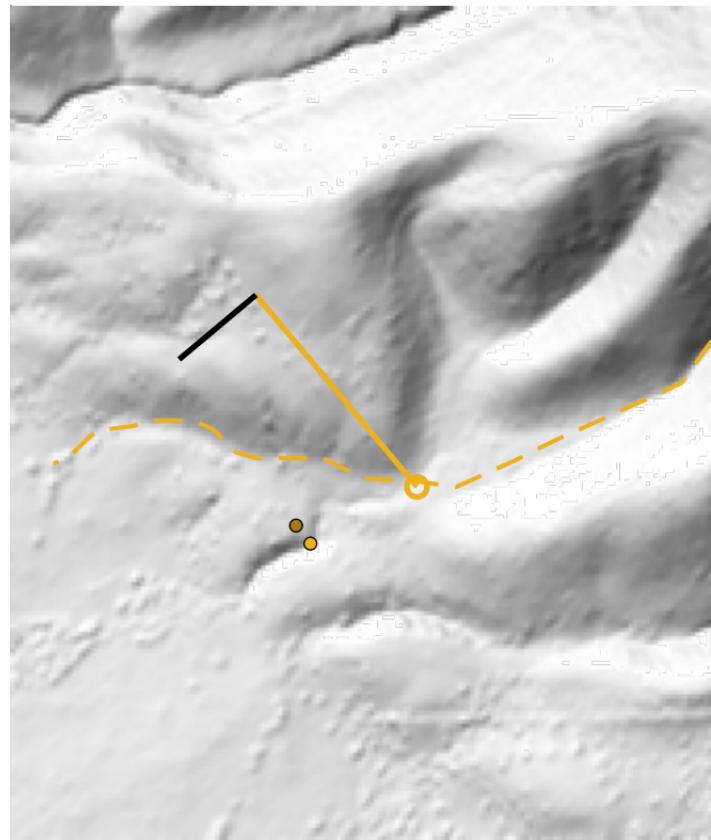
269300

NAD27 UTM 11N

Figure S46
Channel #41: abandoned

- Quaternary faults
- $z_1 = 796.5$ m
- $z_2 = 802$ m
- $h_c = z_2 - z_1 = 5.5$ m
- Upstream reach: 250 m
- $S_0 : 0.08$
- Offset: 320 m
- Avulsion node

3879320



3879140

268180

268320

NAD27 UTM 11N

Figure S47
Channel #42: abandoned

- Quaternary faults
- $z_1 = 764.5 \text{ m}$
- $z_2 = 766.5 \text{ m}$
- $h_c = z_2 - z_1 = 2 \text{ m}$
- Upstream reach: 170 m
- $S_0: 0.14$
- Offset: 60 m
- Avulsion node

3879350

3879100

268150

268400

NAD27 UTM 11N



Figure S48
Channel #43: abandoned

- Quaternary faults
- $z_1 = 766 \text{ m}$
- $z_2 = 769.5 \text{ m}$
- $h_c = z_2 - z_1 = 3.5 \text{ m}$
- Upstream reach: 220 m
- $S_0 : 0.14$
- Offset: 107 m
- Avulsion node

3885200

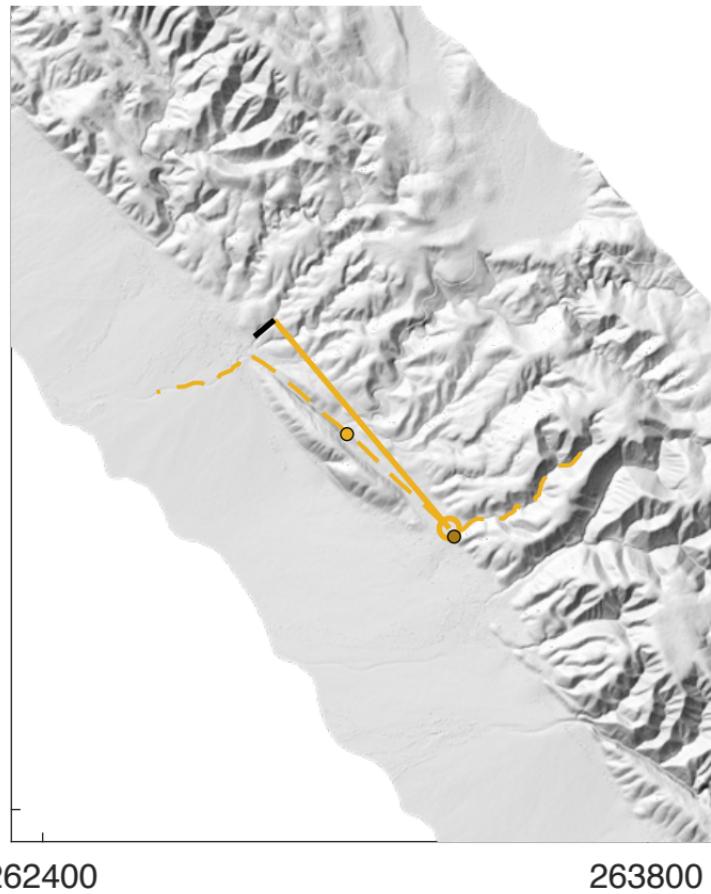


Figure S49
Channel #44: abandoned

- Quaternary faults
- $z_1 = 648.5 \text{ m}$
- $z_2 = 655.2 \text{ m}$
- $h_c = z_2 - z_1 = 6.7 \text{ m}$
- Upstream reach: 443 m
- $S_0: 0.08$
- Offset: 630 m
- Avulsion node

3885800

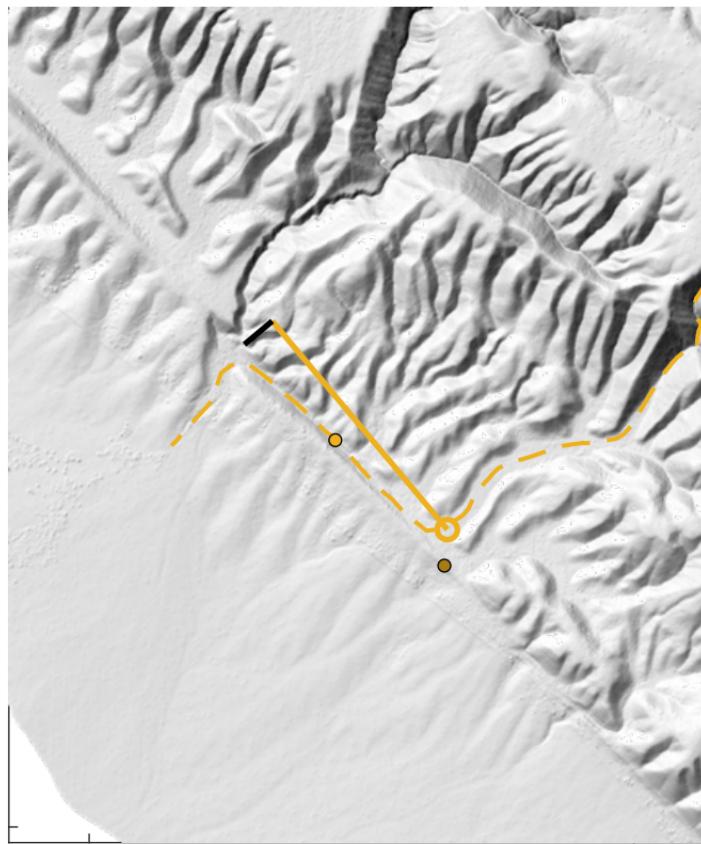


Figure S50
Channel #45: abandoned

- Quaternary faults
- $z_1 = 638 \text{ m}$
- $z_2 = 745 \text{ m}$
- $h_c = z_2 - z_1 = 7 \text{ m}$
- Upstream reach: 462 m
- $S_0: 0.11$
- Offset: 300 m
- Avulsion node

3884900

261800

262400

NAD27 UTM 11N

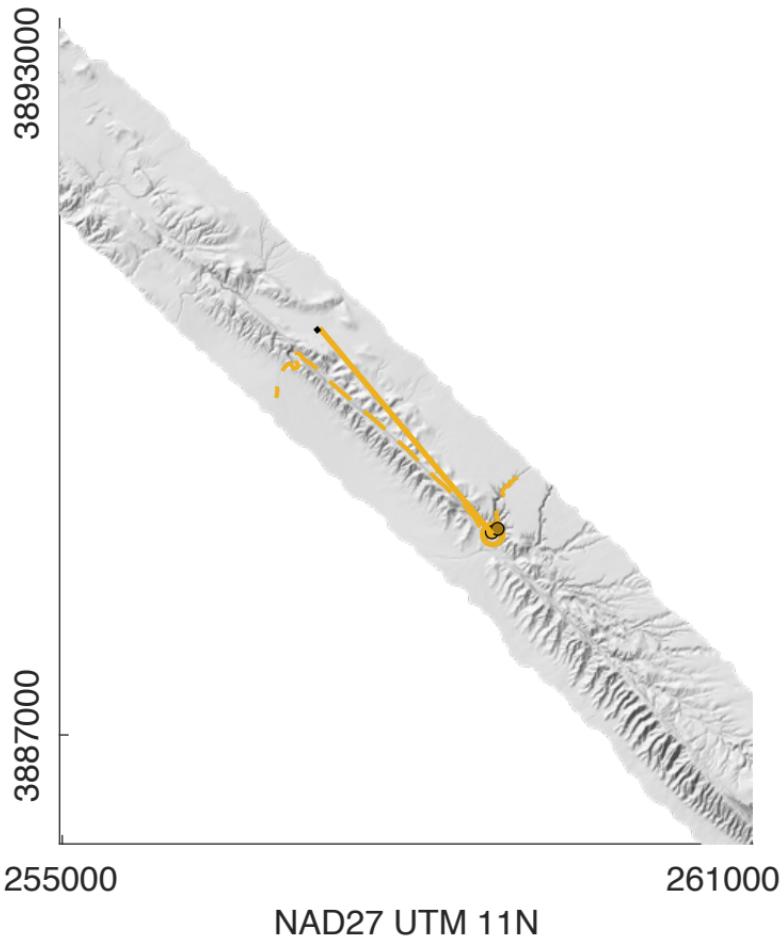


Figure S51
Channel #46: abandoned

- Quaternary faults
- $z_1 = 613 \text{ m}$
- $z_2 = 640 \text{ m}$
- $h_c = z_2 - z_1 = 17 \text{ m}$
- Upstream reach: 868 m
- $S_0 : 0.05$
- Offset: 2440 m
- Avulsion node

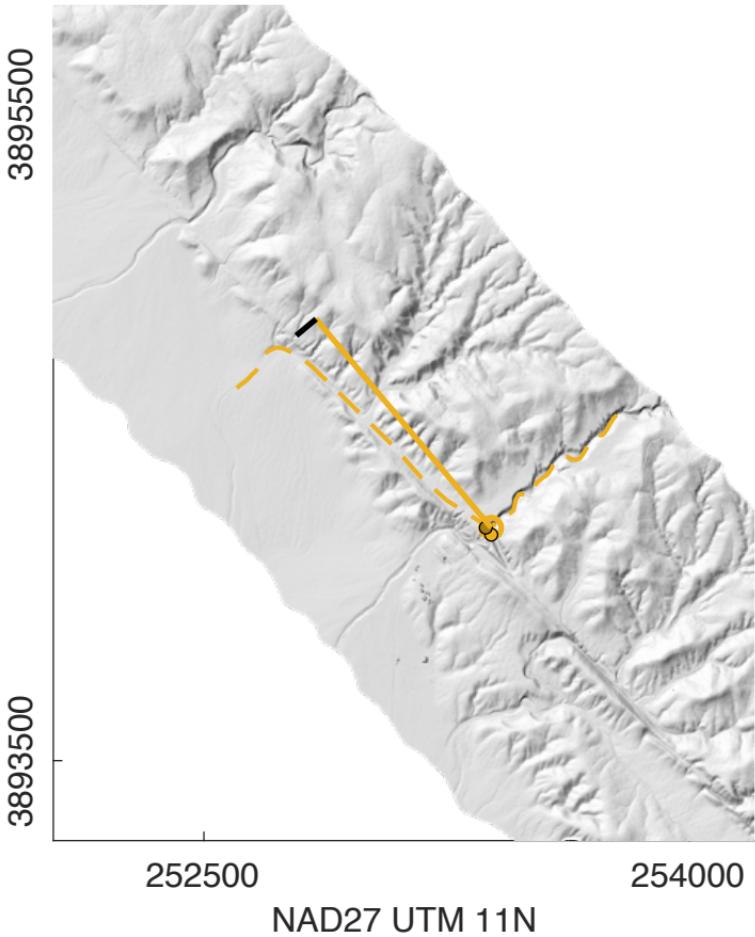
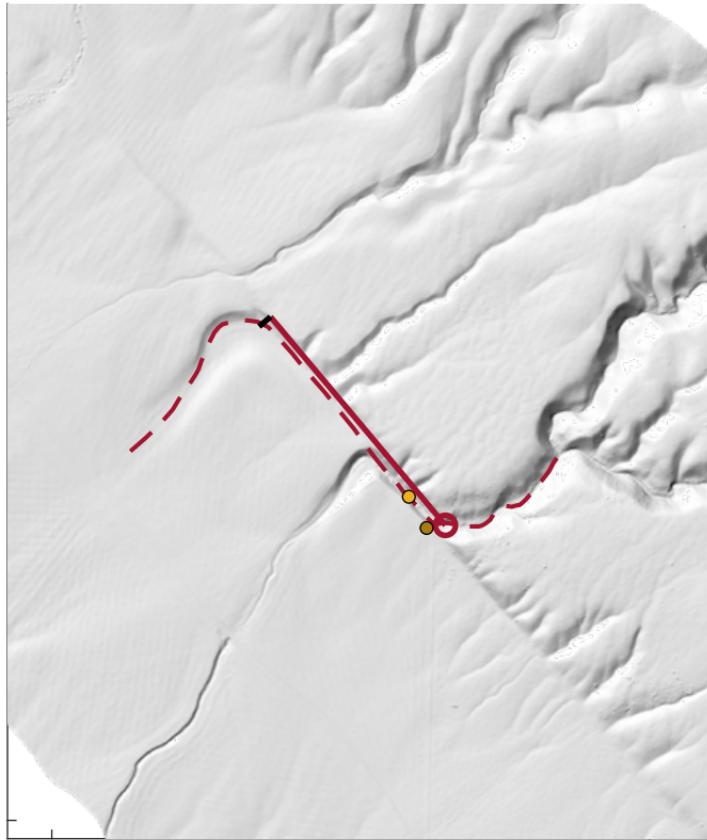


Figure S52
Channel #47: abandoned

- Quaternary faults
- $z_1 = 626.75 \text{ m}$
- $z_2 = 617.75 \text{ m}$
- $h_c = z_2 - z_1 = 9 \text{ m}$
- Upstream reach: 3798 m
- $S_0: 0.022$
- Offset: 842 m
- Avulsion node

3907200



243200

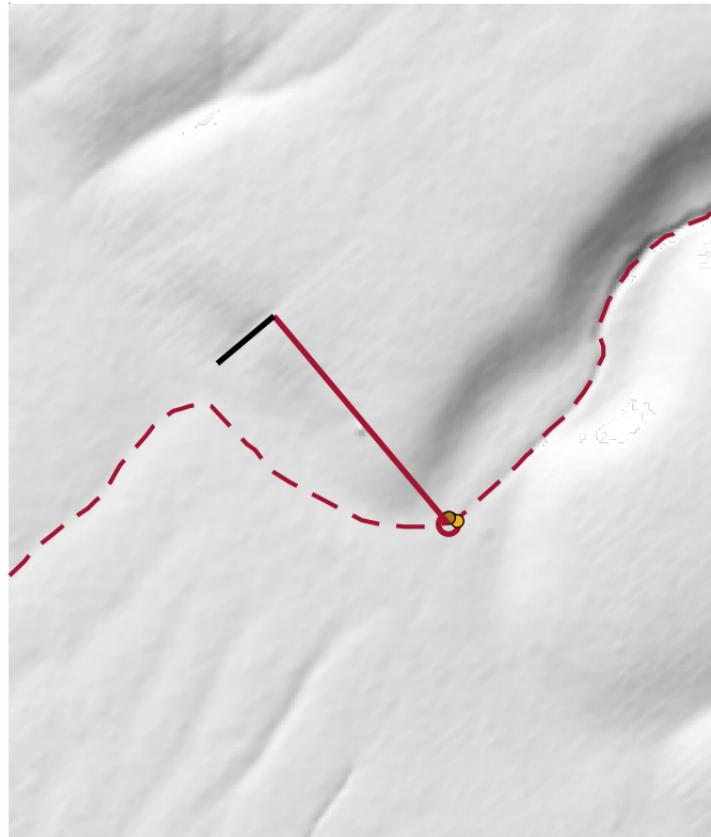
3906200

NAD27 UTM 11N

Figure S53
Channel #48: abandoned

- Quaternary faults
- $z_1 = 654\text{ m}$
- $z_2 = 658.5\text{ m}$
- $h_c = z_2 - z_1 = 4.5\text{ m}$
- Upstream reach: 4317 m
- $S_0: 0.033$
- Offset: 364 m
- Avulsion node

3906300



243200

243350

NAD27 UTM 11N

Figure S54
Channel #49: abandoned

- Quaternary faults
- $z_1 = 657 \text{ m}$
- $z_2 = 657.1 \text{ m}$
- $h_c = z_2 - z_1 = 0.1 \text{ m}$
- Upstream reach: 665 m
- $S_0: 0.07$
- Offset: 81 m
- Avulsion node

3897500

3895500

250500

252500

NAD27 UTM 11N

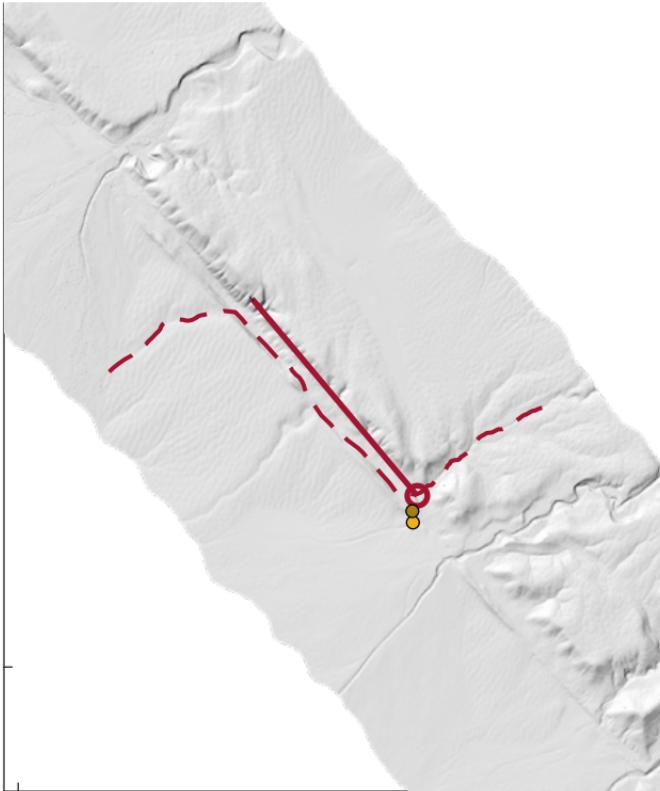


Figure S55
Channel #50: abandoned

- Quaternary faults
- $z_1 = 618 \text{ m}$
- $z_2 = 622 \text{ m}$
- $h_c = z_2 - z_1 = 4 \text{ m}$
- Upstream reach: 1357 m
- $S_0 : 0.04$
- Offset: 800 m
- Avulsion node

3894000



3893000

253600

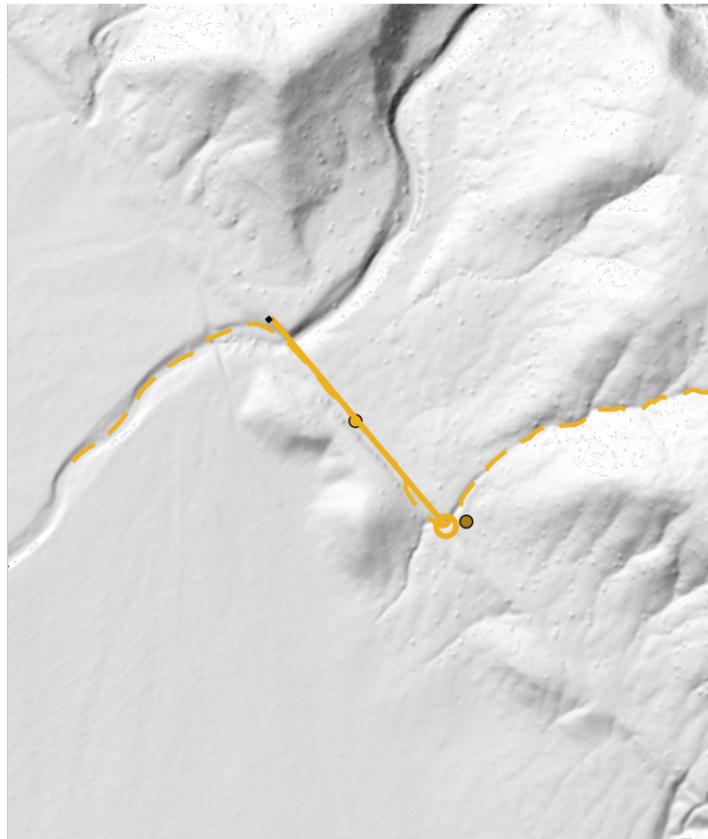
254400

NAD27 UTM 11N

Figure S56
Channel #51: abandoned

- Quaternary faults
- $z_1 = 622.6 \text{ m}$
- $z_2 = 626.8 \text{ m}$
- $h_c = z_2 - z_1 = 4.2 \text{ m}$
- Upstream reach: 281 m
- $S_0 : 0.06$
- Offset: 350 m
- Avulsion node

3895350



252300

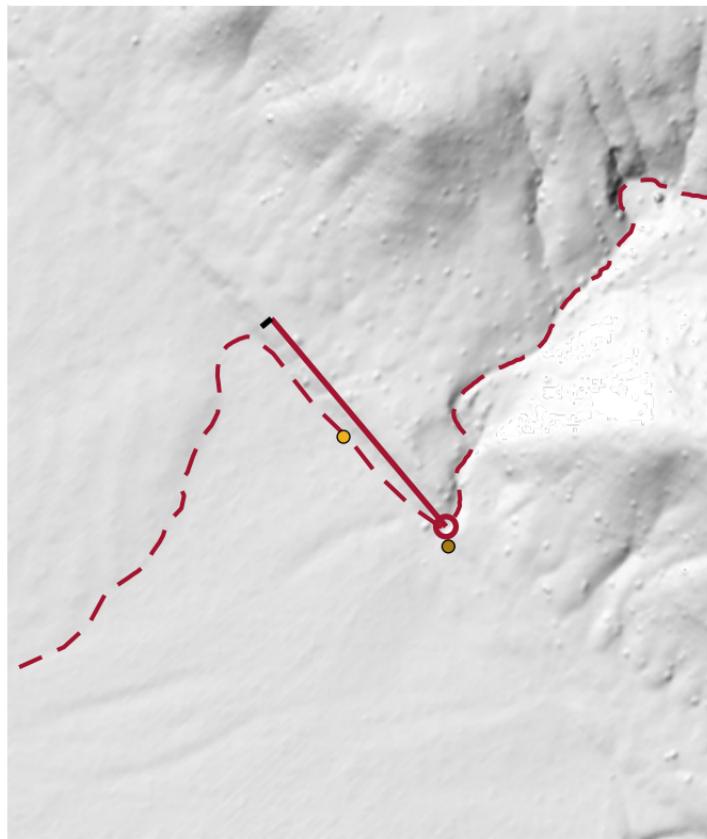
252700

NAD27 UTM 11N

Figure S57
Channel #52: abandoned

- Quaternary faults
- $z_1 = 624 \text{ m}$
- $z_2 = 626 \text{ m}$
- $h_c = z_2 - z_1 = 4 \text{ m}$
- Upstream reach: 228 m
- $S_0 : 0.08$
- Offset: 192 m
- Avulsion node

3895550



252150

252400

NAD27 UTM 11N

Figure S58
Channel #53: abandoned

- Quaternary faults
- $z_1 = 619 \text{ m}$
- $z_2 = 620.5 \text{ m}$
- $h_c = z_2 - z_1 = 1.5 \text{ m}$
- Upstream reach: 1126 m
- $S_0 : 0.05$
- Offset: 127 m
- Avulsion node

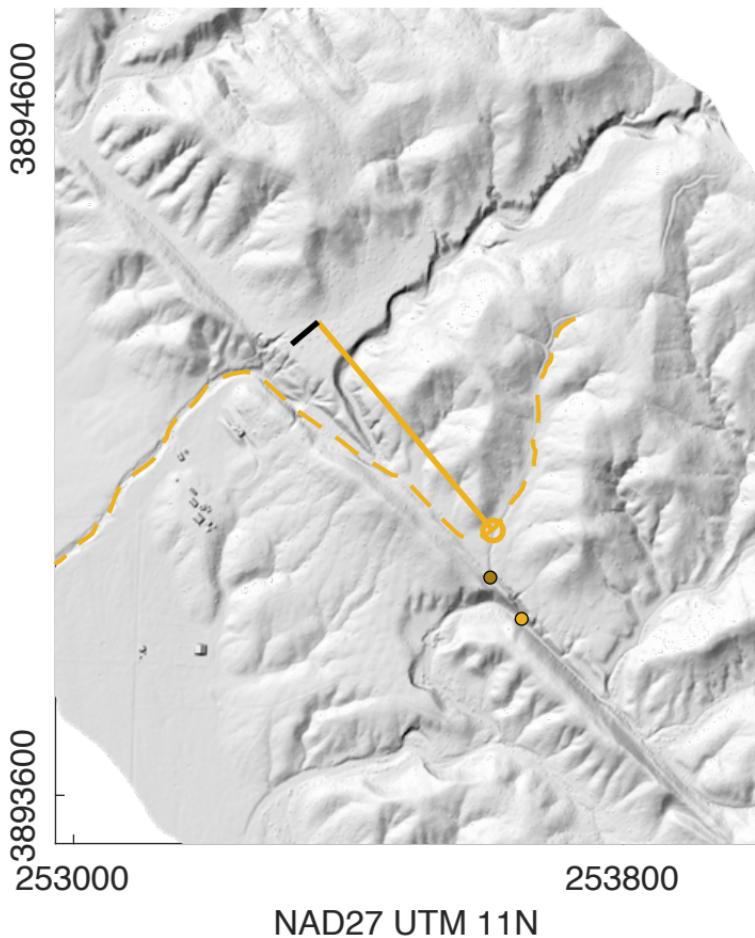
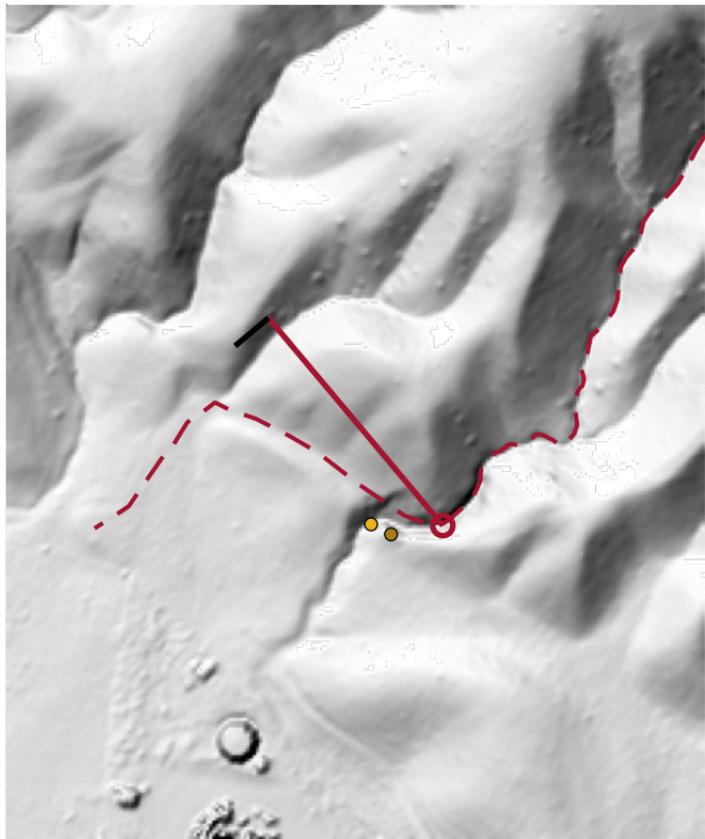


Figure S59
Channel #54: abandoned

- Quaternary faults
- $z_1 = 604 \text{ m}$
- $z_2 = 615 \text{ m}$
- $h_c = z_2 - z_1 = 11 \text{ m}$
- Upstream reach: 386 m
- $S_0: 0.028$
- Offset: 396 m
- Avulsion node

3876500



271450

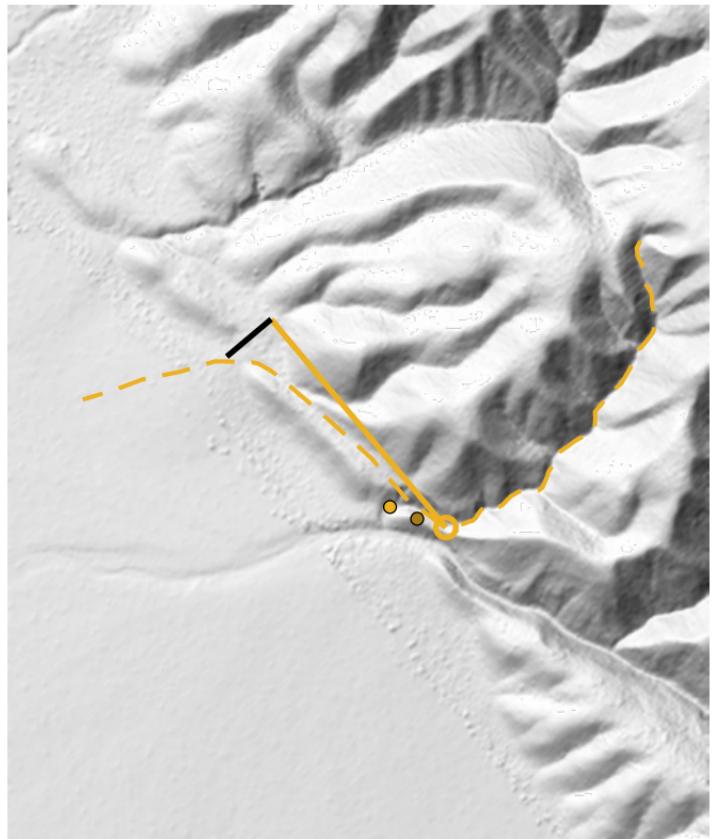
271600

NAD27 UTM 11N

Figure S60
Channel #55: abandoned

- Quaternary faults
- $z_1 = 859$ m
- $z_2 = 864.5$ m
- $h_c = z_2 - z_1 = 5.5$ m
- Upstream reach: 279 m
- $S_0 : 0.15$
- Offset: 87 m
- Avulsion node

3883900



3883450

263450

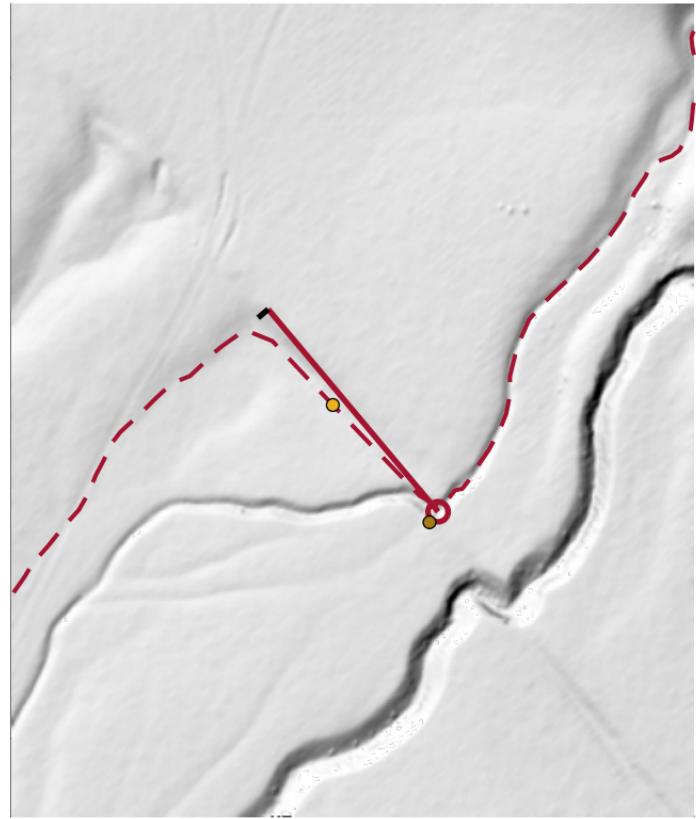
263800

NAD27 UTM 11N

Figure S61
Channel #56: abandoned

- Quaternary faults
- $z_1 = 659.5 \text{ m}$
- $z_2 = 666.5 \text{ m}$
- $h_c = z_2 - z_1 = 6 \text{ m}$
- Upstream reach: 196 m
- $S_0 : 0.14$
- Offset: 155 m
- Avulsion node

3905450



243850

244100

NAD27 UTM 11N

Figure S62
Channel #57: abandoned

- Quaternary faults
- $z_1 = 644.3 \text{ m}$
- $z_2 = 646 \text{ m}$
- $h_c = z_2 - z_1 = 1.7 \text{ m}$
- Upstream reach: 2072 m
- $S_0 : 0.04$
- Offset: 120 m
- Avulsion node

3904700

3904500

244400

244650

NAD27 UTM 11N

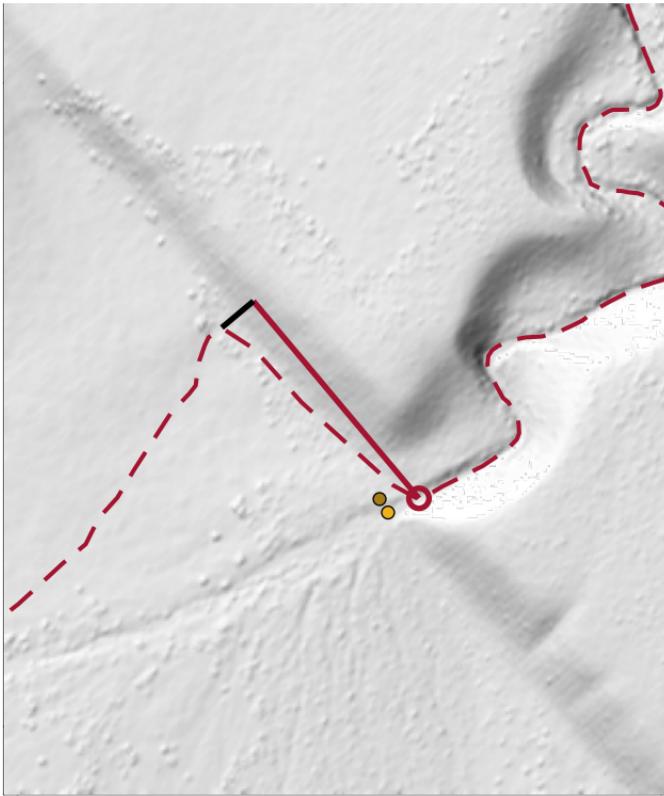
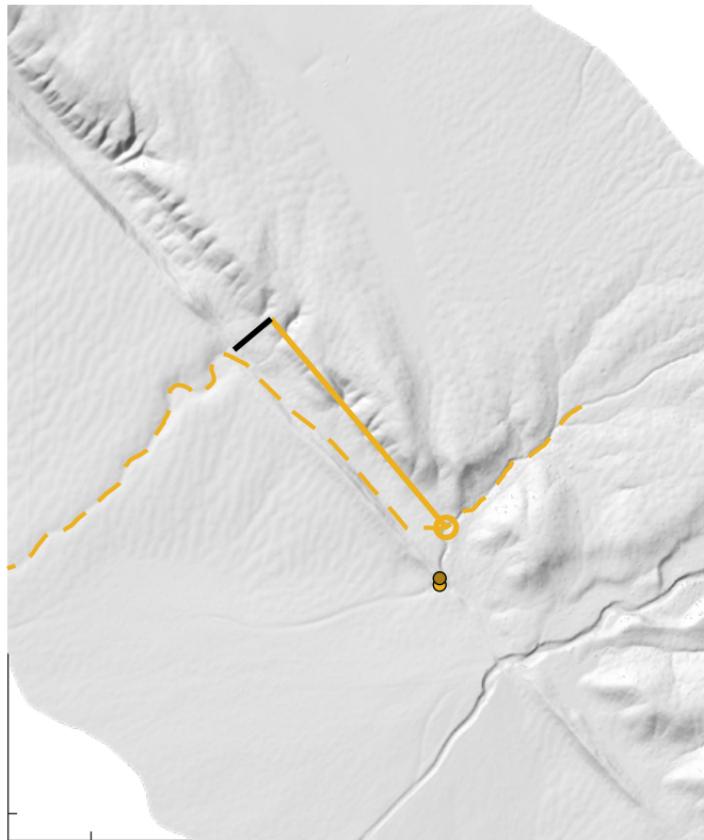


Figure S63
Channel #58: abandoned

- Quaternary faults
- $z_1 = 638.2 \text{ m}$
- $z_2 = 639.8 \text{ m}$
- $h_c = z_2 - z_1 = 0.6 \text{ m}$
- Upstream reach: 7401 m
- $S_0 : 0.046$
- Offset: 100 m
- Avulsion node

3896800



252000

3895600

251200

NAD27 UTM 11N

Figure S64
Channel #59: abandoned

- Quaternary faults
- $z_1 = 618.5 \text{ m}$
- $z_2 = 622.2 \text{ m}$
- $h_c = z_2 - z_1 = 3.7 \text{ m}$
- Upstream reach: 1320 m
- $S_0: 0.042$
- Offset: 418 m
- Avulsion node