Philip Williams and Associates, Ltd., "Memorandum Regarding Channel Geomorphic Assessment of Lion Canyon" (June 12, 2007; 2007c)

PWA
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M E M O R A N D U M

Date:	June 12, 2007
To:	Matt Carpenter and Corey Harpole
Organization:	Newhall Land and Farming Company
From:	Andrew Collison
PWA Project #:	1820.02
PWA Project Name:	Newhall Ranch
Subject:	Channel geomorphic assessment of Lion Canyon
Copy(ies) To:	Lisa Austin, File

Purpose of Investigation

PWA conducted reconnaissance-level geomorphic assessments and collected sediment samples from the beds and banks of Lion Canyon near Valencia, CA, to support sediment transport modeling, geomorphic and channel design activities.

Data Collection

Fieldwork was carried out between February 7th and 9th 2006 with repeat visits to selected sites in summer of 2006. The channel was walked for its entire length within the Newhall Ranch project area. A total of 8 sediment samples were taken from the channel bed. Sediment samples were collected approximately every 1000 feet along the channels. Sites were selected by pre-programming GPS coordinates along the streambed at fixed intervals and then identifying geomorphically-typical reaches close to the site. At each sampling point the nearest mid–channel or point bar was selected and a sample taken from a position one third from the upstream edge of the bar, in accordance with sediment sampling protocols outlined by Reid and Dunne (1996) and Thomas and Gee (2005). Sediment taken from this location is believed to be representative of average-sized sediment that is in transport through the system. Samples were collected by digging a 6 inch pit in the bed and transferring the entire sample to a polythene bag. Bank samples were taken from actively eroding banks where they appeared to be the main source of sediment in the channel. Typically in all creeks studied the bed samples had a thin veneer of gravel but were dominated by sand beneath that. Samples were transferred to Cooper Testing Laboratory for particle size distribution. Most samples were clearly non-cohesive and were analyzed by wet sieving. A few appeared to be cohesive and were sampled using the hydrometer method to differentiate silt and clay from coarser sediment.

The sample locations and particle size distribution curves are shown in the attached figure, with typical sediment sizes and channel geomorphic assessment for context. A reconnaissance-level geomorphic assessment was conducted, primarily focused on the degree of channel incision (disconnection between the bankfull channel and floodplain). This was assessed by running a HEC-RAS model with the 5-year flow (model and data supplied by PACE) to determine the extent to which the 5-year flow was confined in a well defined bankfull channel or not. This was based on the observation of SCCWRP (Coleman et. al. 2005) that stable channels in this area contain the 5-year flow. Where the 5-year flow did not fill what appeared to be the bankfull channel and qualitative geomorphic evidence supported the assessment the channel was classified as incised or widening. Figures from the reconnaissance are attached to this memo.

Summary of Sediment Characteristics

7 samples were classified as sand with 1 gravel.

Summary of Geomorphic Assessment

Lion Canyon has steep headwaters (above the project boundary) that feed into a slightly eroded upper channel reach (Images #1 – 6) transitioning gradually to a more stable reach with a well connected and vegetated floodplain (Images 7-9). This incorporates a reach with mature oaks (Images 10-13) before transitioning back to additional stable floodplain (Image 14). There is a very sharp transition from stable to unstable conditions at the road crossing, which acts as a grade control protecting the upper reaches from incision. The source of the incision is likely uncontrolled drainage from the unimproved road surface. Downstream of the grade control is a 12 foot high knickpoint (Image 15) and a reach of deeply incised channel with some failing banks (Images 16 and 17 near to more mature oaks. This reach opens up into a wider section (Images 18-20) where the channel is eroding into relict terraces, triggering extensive bank collapses. Downstream the channel become slightly more stable but still remains incised with erosion on the outside bends and the formation of a small new floodplain on the inner bends (Images 21-22). The right valley side looking downstream is undercut by the creek, creating a high unstable slope. This reach culminates in a 8 foot high knickpoint (further evidence of incision) leading to the Santa Clara River.

References

Coleman, D., MacRae, C. and Stein, E.D., 2005, Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams.

Reid, L. M. and T. Dunne, 1996. Rapid Evaluation of Sediment Budgets. GeoEcology Paperback. Catena Verlag Gmbh. 164 p.

Thomas, William, and Gee, D. M. 2005. Sedimentation in Stream Networks (HEC-6T) – Supplement to the User Manual. 36 p.

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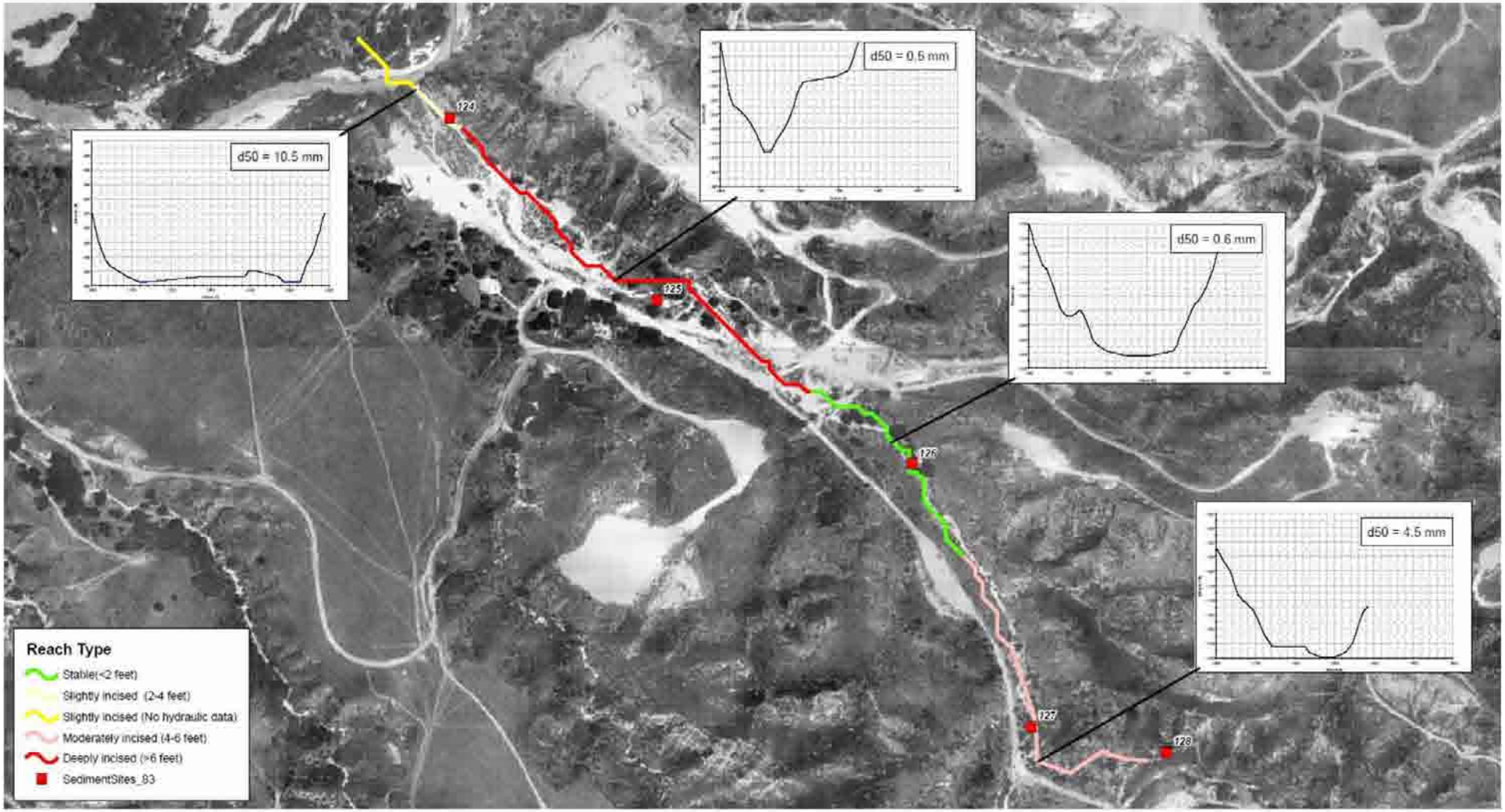
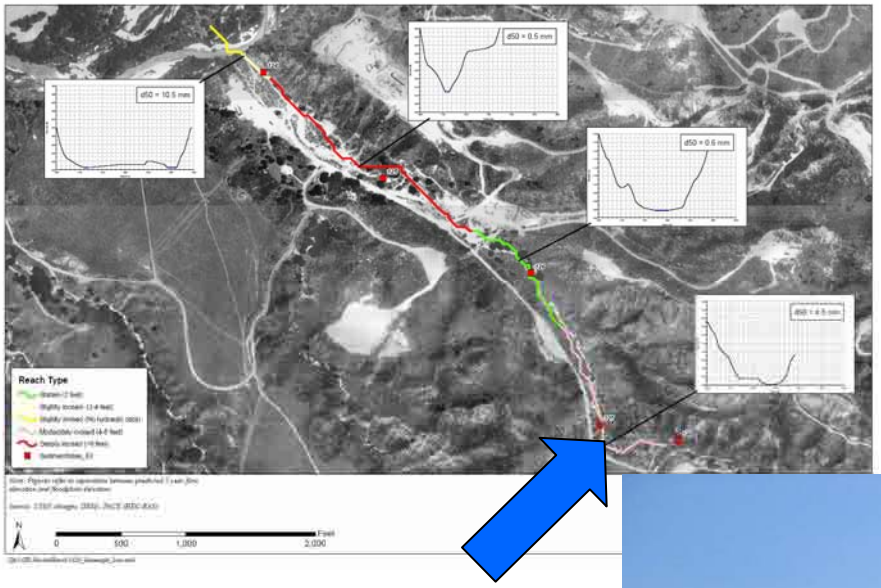
Lion Canyon

Geomorphic Reconnaissance

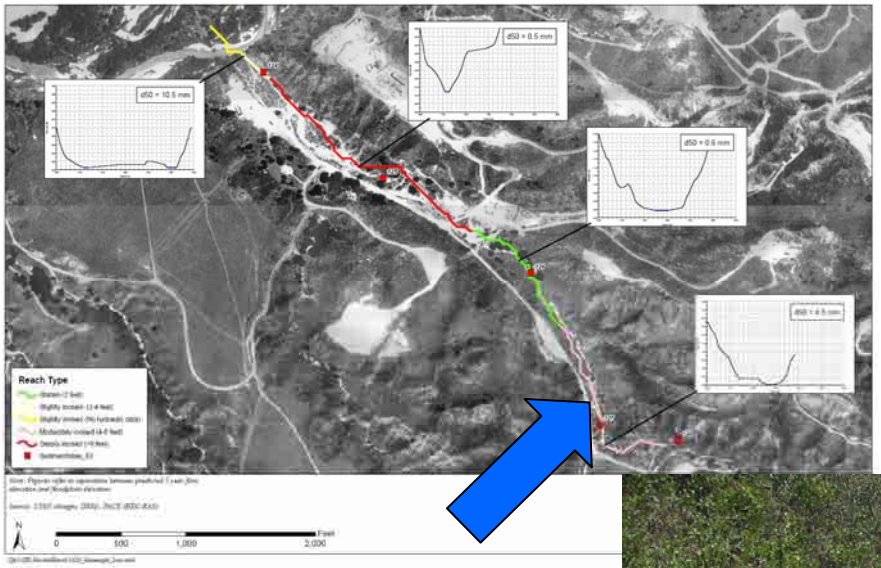
Reach distribution





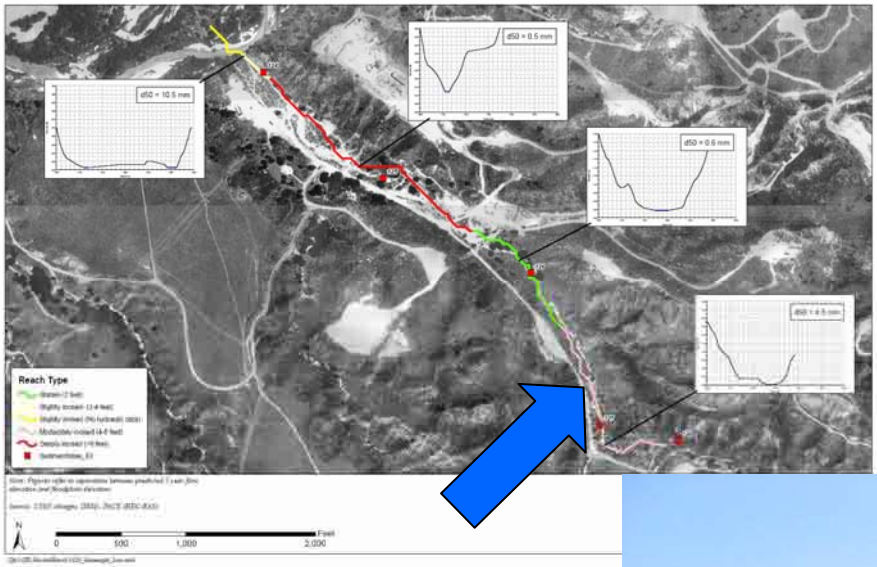
Slightly eroded

Lion #1



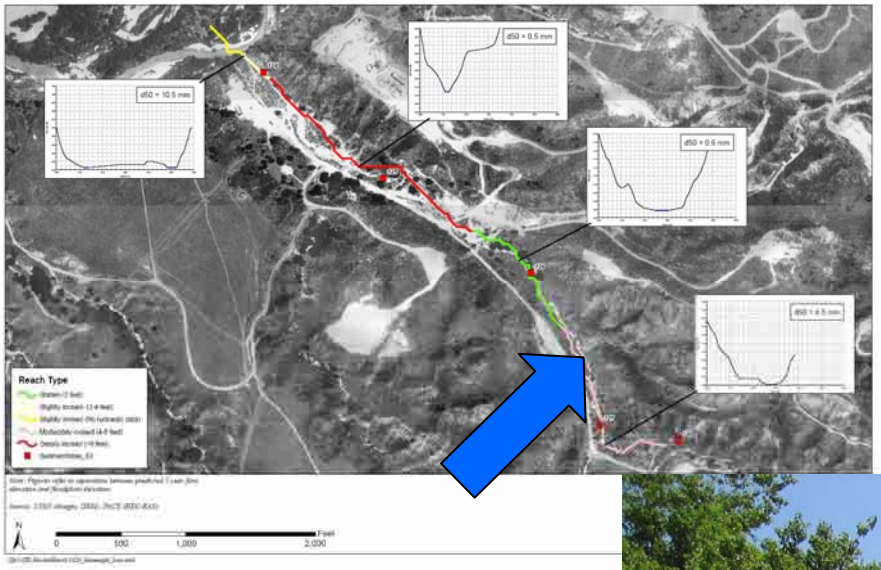
Slightly eroded

Lion #2



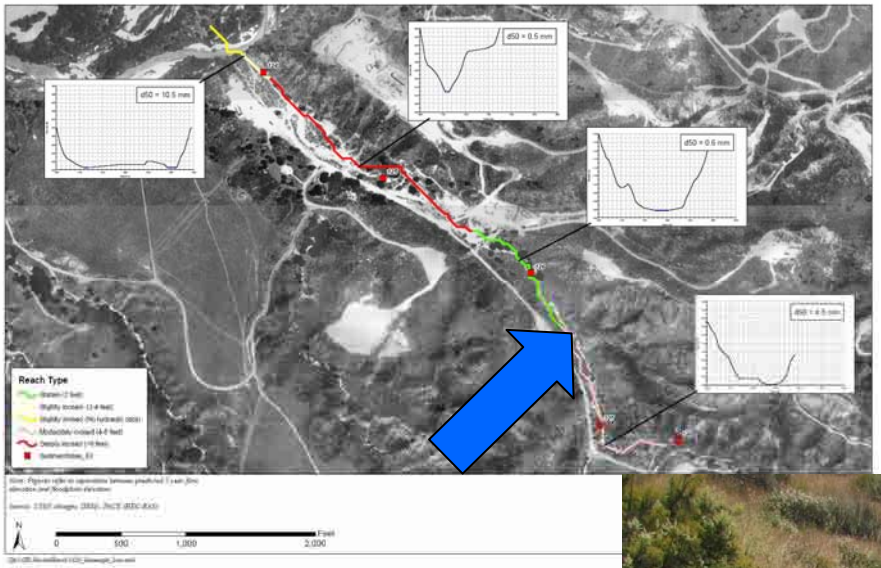
Slightly eroding outside bends, inner floodplain

Lion #4



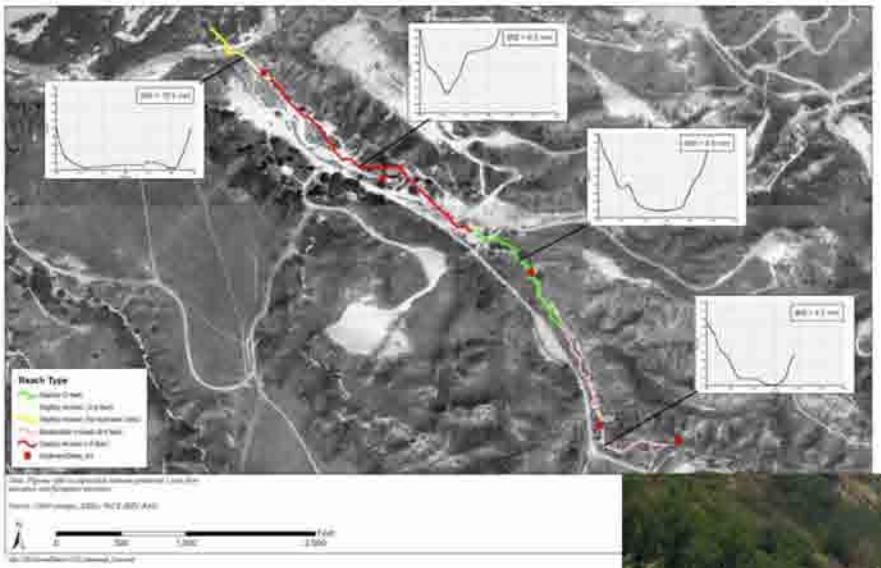
Stable - slightly eroded

Lion #5



Stable - slightly eroded

Lion #6



Stable

Lion #7

Stable

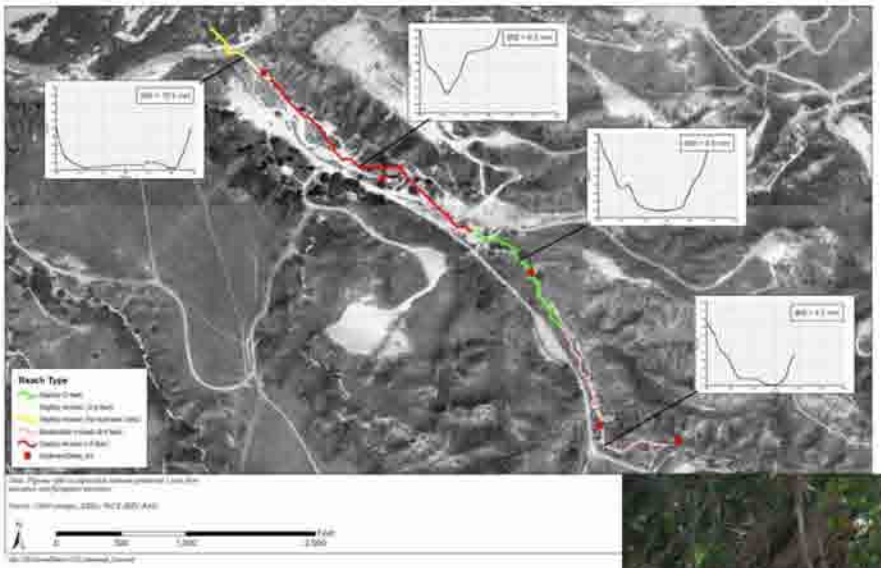
Lion #8

Stable

Lion #9

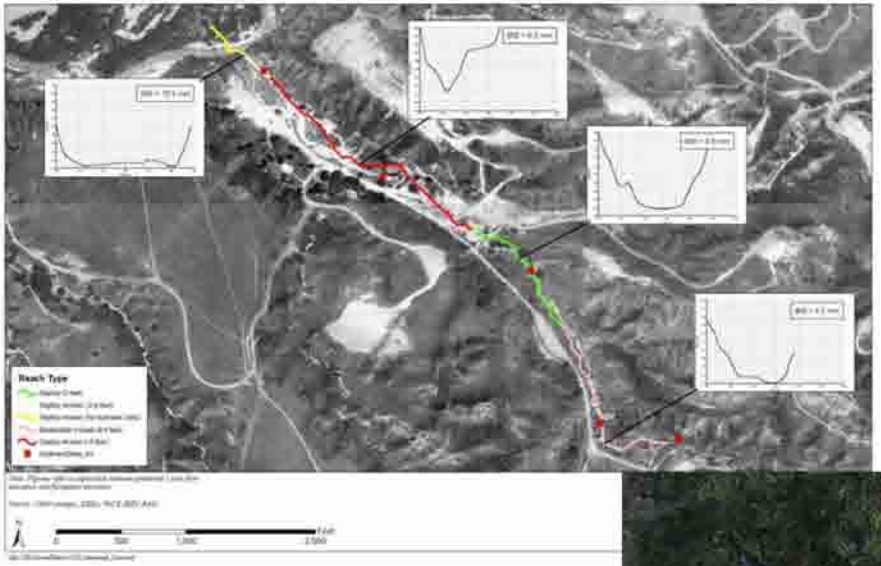
Stable

Lion #10



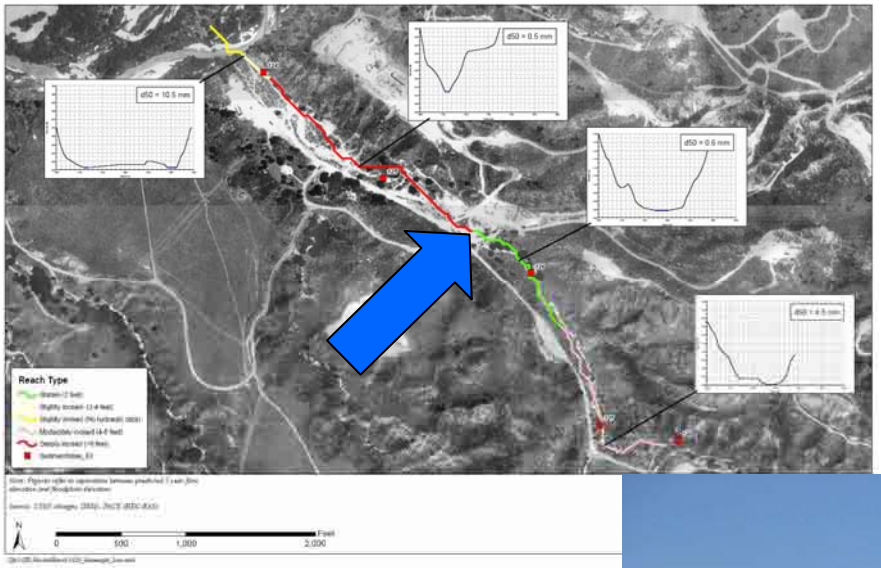
Stable

Lion #11



Stable

Lion #12

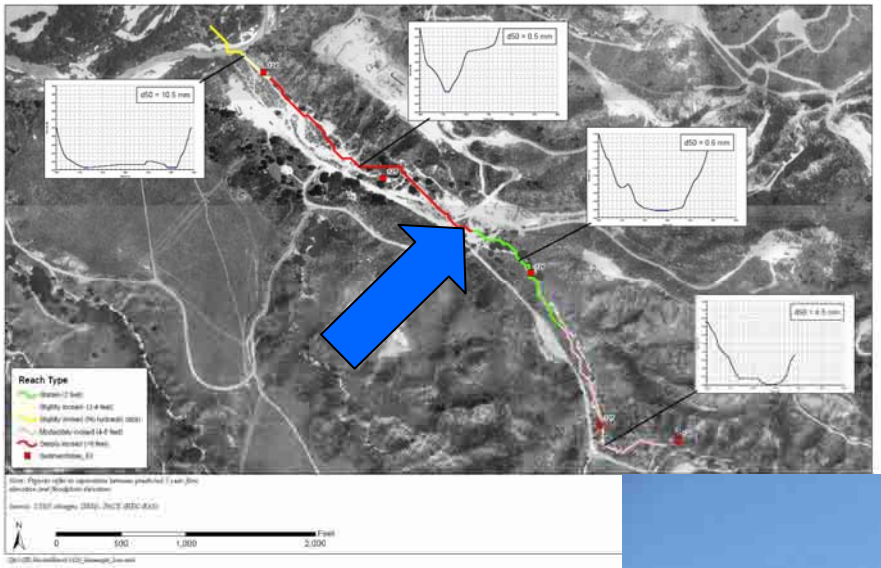


Stable – slightly aggradational

Lion #13

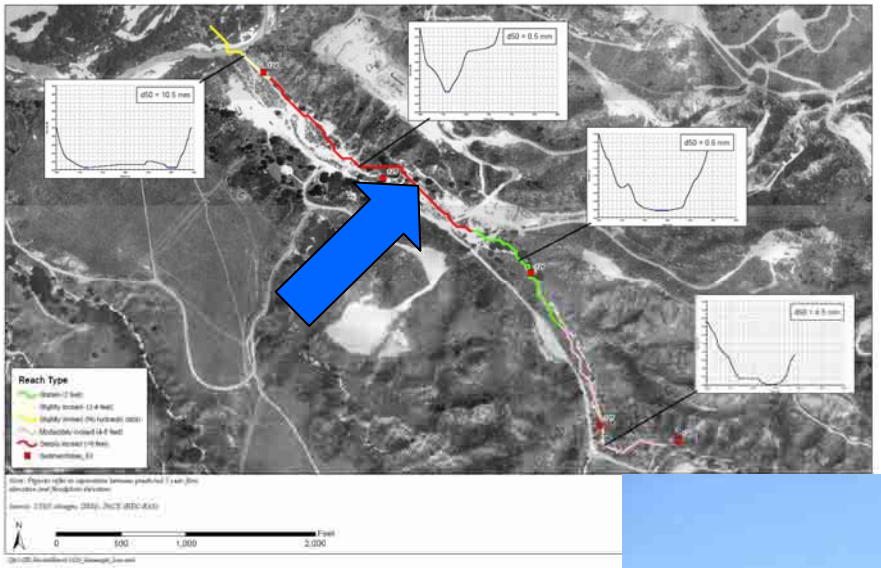
Stable

Lion #14



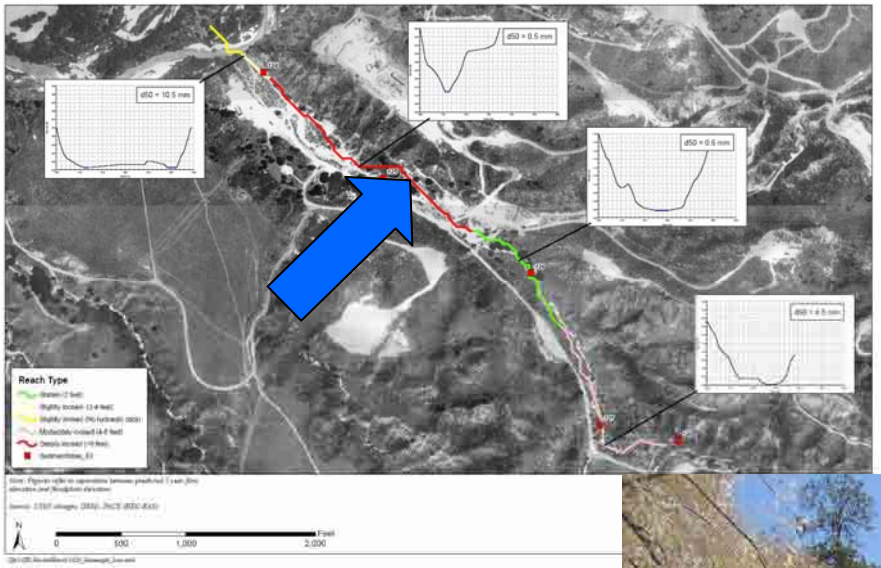
Deeply incised

Lion #15



Deeply incised

Lion #16

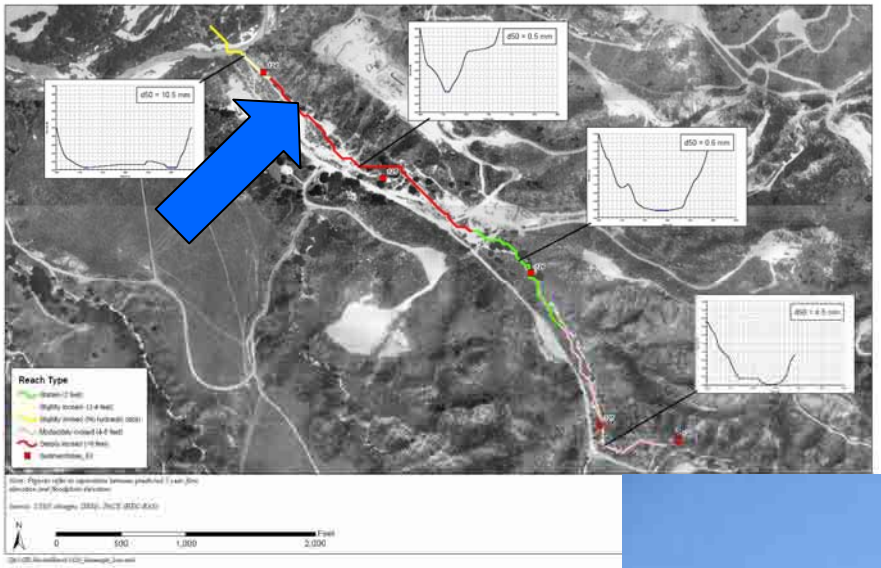


Deeply incised

Lion #17

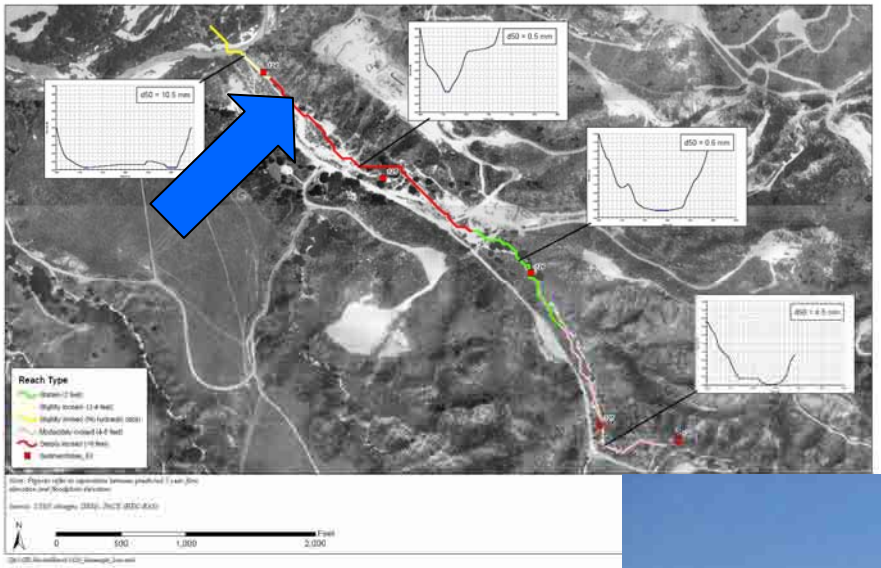
Slightly incised – relict terraces eroding on outside bends

Lion #18



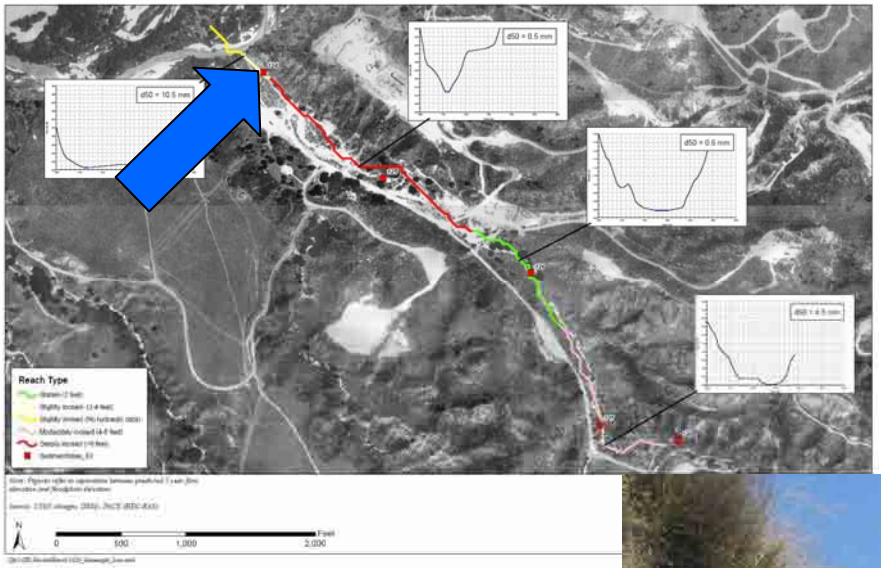
Slightly incised – relict terraces eroding on outside bends

Lion #19



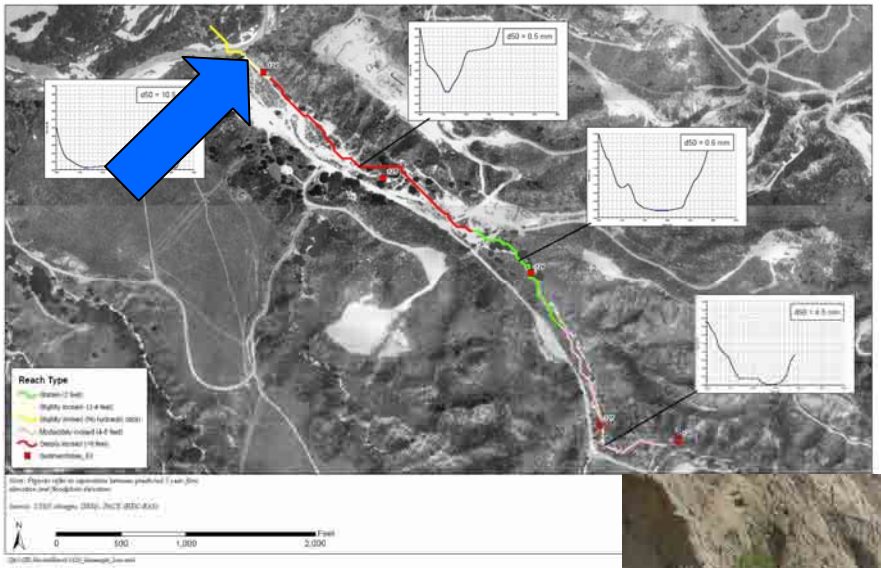
Slightly incised – relict terraces eroding on outside bends

Lion #20



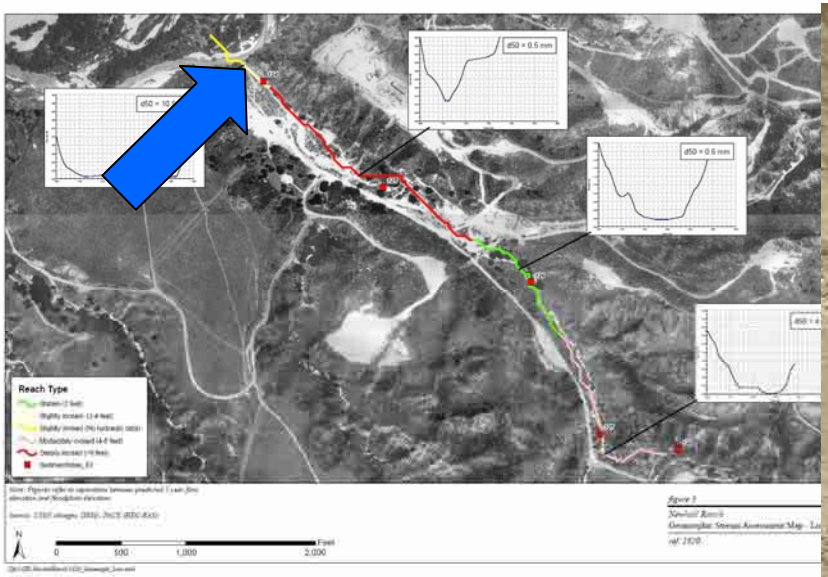
Slightly incised – relict terraces eroding on outside bends

Lion #21



Slightly incised – relict terraces eroding on outside bends and large undercut valley side

Lion #22



Deeply incised with knickpoint and large undercut valley side

Lion #23