

Analysis of NAIP imagery acquired during 2009

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Below is the summary of shadow analysis for the NAIP imagery collected in 2009. Only the affects of shadows were considered here, not color or contrast. General observations are first, then a note about the rating system used and what was used to determine each rank. Italicized bullets are recommendations to consider. Tables are summaries used to make notes and recommendations, and are divided by rank, then by county. The county summaries are the most detailed, showing date, times, sun elevations, rank, and notes. Pictures of problem areas are included in the county summaries.

- Problems worse in areas where hills/mountains are prevalent
 - The steeper the hillside, the worse shadows tended to be
 - Combination hillside & tree worsens shadows
- Very flat areas not really affected, even if the sun is lower.
- More problem areas found in early morning than late afternoon
- Areas with mountain slopes facing east-west had more problem areas

- Ratings: bad, ok, good
 - Dependent on level of obstruction from shadows
 - Flat areas tended to score better even at lower sun angles b/c not as much to cause shadows
 - Some areas are ranked as “bad to ok” or “ok to good”. Such a ranking usually indicates terrain changes across the area, so areas with mountains are bad, but the same block contains very flat areas that might be ok or good.

- **Recommended minimum sun elevation = 40 degrees.**
 - **There were no "ok" ratings below approximately 40 degrees**
 - **Areas of flat terrain can use 30 degrees sun elevation without adverse effects**
 - **Areas with steep slopes (high mountains, for example) would be better > 45 deg**
- **Recommended flight times between 10:30 am and 2 pm**
 - **Flatter areas can be flown sooner than mountainous areas**

Results by ranking:

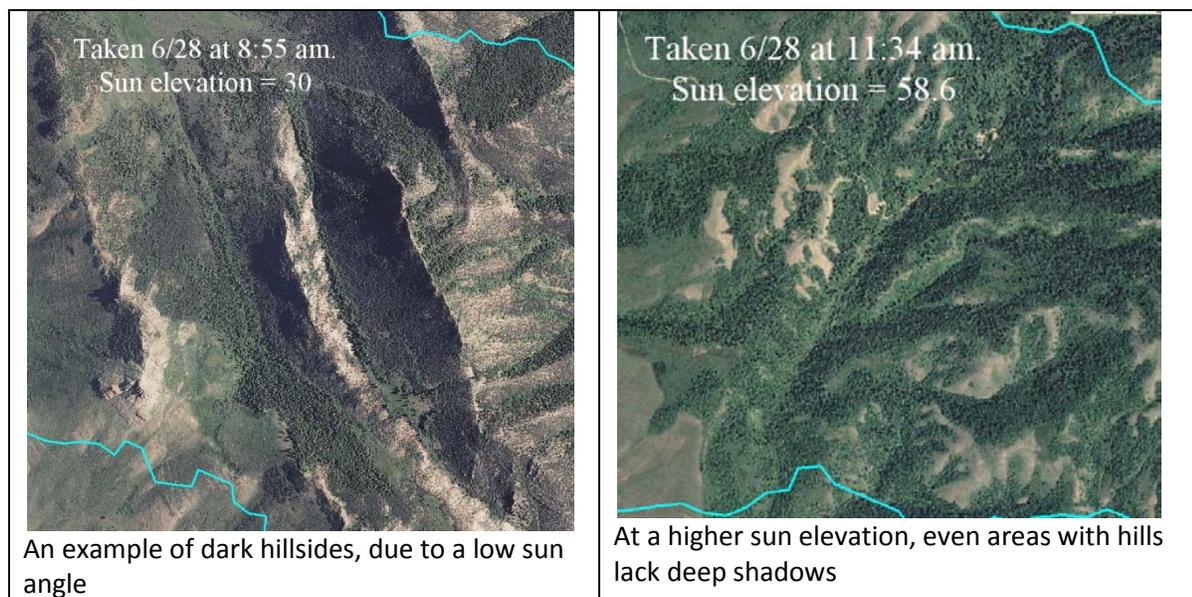
Time and sun elevations are approximate, since imagery was collected across several dates, and shadows vary by time of year as well as time of day. Keep in mind that in flat areas the sun can be lower without having shadow problems.

Rank:	Approximate time ranges:	Approximate sun elevations:
Bad	9:00 – 10:40 am; 15:00 – 16:10 pm	31.2 – 45.1
Bad to OK	8:50 – 11:40 am; 14:15 – 16:25 pm	27.3 – 65.6
OK	9:50 am – 15:45 pm	39.9 – 67.4
OK to Good	10:10 – 10:25 am; 15:45 – 16:05 pm	43.7 – 56.6
Good	10:40 am – 16:15 pm	46.8 – 70.7

Results by county – more detail:

Bannock

Date	Time Range	Sun Elevation	Overall Quality	Notes
6/28	8:51 – 9:56	29.6 – 41.5	Bad to OK	Hillsides tended to be shaded, some completely dark. Long shadows coming from trees.
	10:08 – 10:18	43.7 – 45.5	OK	Some shading on hillsides
	11:03 – 13:41	53.5 – 70.3	Good	n/a
	15:28 – 16:16	59.2 – 51.1	Good	Some shading on hills. Much of area covered is near the reservoir, so very flat.
7/22	10:08 – 10:41	41.2 – 47.1	Bad to OK	Near the reservoir, so overall very flat, but problems near building and large trees.



Bingham

6/28	9:00 – 9:46	31.5 – 39.9	Bad to OK	Hillsides shaded, steep hills are dark. Some tree problems. Flat areas ok.
	10:18 – 10:23	45.6 – 46.5	OK to Good	Still some shading on hillsides.
	10:58 – 13:36	52.6 – 69.9	Good	n/a
	15:31 – 16:16	58.3 – 50.8	Good	Very flat terrain.
7/5	9:56 – 10:37	41.1 – 48.4	OK	Rock outcrops produced dark shadows.
7/10	11:43 – 11:48	58.8 – 59.6	Good	n/a
7/15	11:21 – 11:27	54.8 – 55.7	Good	Very flat terrain.
7/21	11:01 – 11:02	50.6 – 50.8	Good	n/a
7/22	10:00 – 10:11	39.9 – 41.6	OK	Flat terrain, some problems around building & on some hillsides
	10:39 – 10:50	46.8 – 48.6	Good	Very flat terrain, occasional shadows around building & large trees.
	11:20 – 12:06	53.6 – 60.3	Good	Very flat terrain.



Taken 6/28 at 9:02 am.
Sun elevation = 31.6

Deep shadows can be seen around steep hills.



Taken 7/22 at 10:48 am.
Sun elevation = 48.5

Even with a higher sun elevation, rocky outcrops can leave significant shadows. The flat area around the butte has no shading at all, and will not even at lower sun elevations.

Butte

7/15	11:26 – 14:22	54.8 – 66.2	Good	Some problems near very steep slopes.
7/20	9:15 – 10:06	44.3 – 45.4	Bad	Shaded-to-dark hillsides, long tree shadows
	10:28 – 10:34	44.3 – 45.4	OK	Problems around steep slopes
	11:29 – 12:53	54.6 – 65.2	Good	Occasional shadows
7/22	9:57 – 12:13	38.5 – 60.6	Good	Very flat terrain
8/20	10:56 – 10:58	43.6 – 43.9	OK	Shaded hillsides, steep slopes dark



Taken 7/20 at 9:24 am.
Sun elevation = 32.8

Example of deep, dark shadows.

Clark

6/28	9:17 – 9:31	34 – 36.6	Bad	Most of the area is flat. Hillsides are very dark.
	10:31 – 10:51	47.3 – 50.8	OK	Mostly flat terrain. Some problems on hillsides with trees.
	11:47 – 13:23	59.9 – 69.5	Good	Flat
	15:44 – 16:03	56.6 – 53.4	OK to Good	Shaded hillsides, especially around trees.
7/5	9:09 – 9:24	32 – 34.7	Bad	Shaded hillsides & long tree shadows
7/15	11:35 – 11:39	56.3 – 56.9	Bad to OK	Some shading on hillsides, especially on steep slopes
7/22	9:49 – 9:57	37.3 – 38.7	Bad	Shaded hillsides, some completely dark. Tree shadows are long
	10:54 – 11:15	48.7 – 52.1	OK	Some shading on hills & around trees
	12:12 – 12:20	60.4 – 61.4	Good	Shadows on very steep slopes
8/20	10:31 – 10:40	69.7 – 41.1	Bad	Shaded hillsides, some completely dark.

*Custer was divided into 2 sections for image taking

Custer – part 1

7/1	10:20 – 10:26	44.1 – 45.2	Bad	Shaded hillsides, some completely dark. Tree shadows are long
	11:32 – 13:01	56.3 – 67.4	OK	Some problem shadows
7/20	10:59 – 11:57	48.7 – 57.7	OK	Problem shadows around large trees/steep slopes
	12:21 – 14:52	60.9 – 62.4	Good	Occasional shadow near rock outcrops
7/31	9:58 – 10:33	36.5 – 42.6	Bad	Shaded hillsides, some completely dark. Tree shadows are long
	11:00 – 11:05	47.1 – 47.9	OK	Some shadow near rock outcrops/trees
8/11	10:11 – 10:32	36.9 – 40.5	Bad	Shaded hillsides, some completely dark. Tree shadows are long
	12:02 – 12:07	54 – 54.6	OK	Some shadow near rock outcrops/trees
8/19	9:24 – 11:14	27.3 – 45.6	Bad to OK	Shaded hillsides, some completely dark. Tree shadows are long
	16:10 – 16:54	45 – 38	Bad	Shaded hillsides, some completely dark. Tree shadows are long
8/20	15:34	49.8	OK	Problem tree shadows on steep hillsides

Taken 7/20 at 11:48 am.
Sun elevation = 56.45



Taken 7/31 at 10:06 am
Sun elevation = 37.94

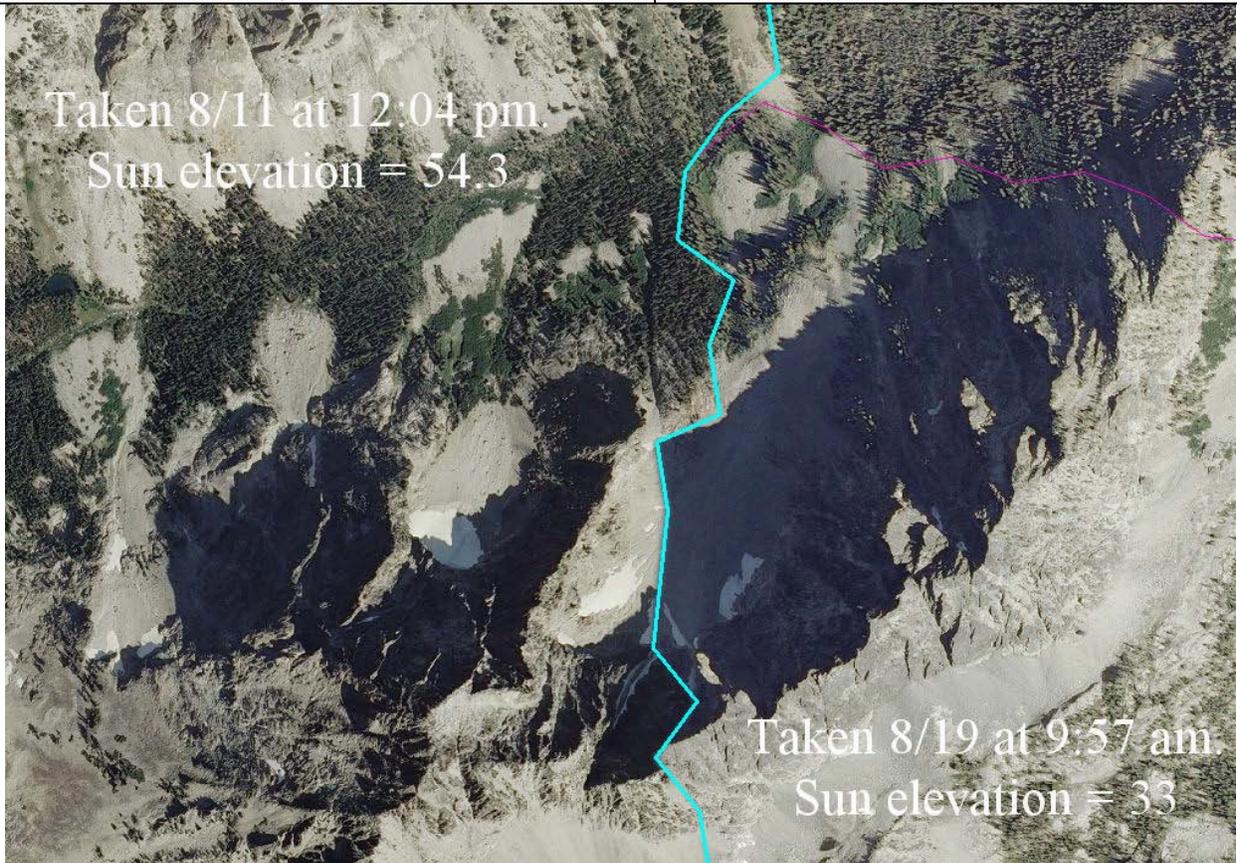
Taken 7/31 at 10:01 am.
Sun elevation = 37



Some of the shadows for the earlier time can be attributed to there being more and steeper slope, some areas can be compared.

Another example of shaded hillsides.

Taken 8/11 at 12:04 pm.
Sun elevation = 54.3

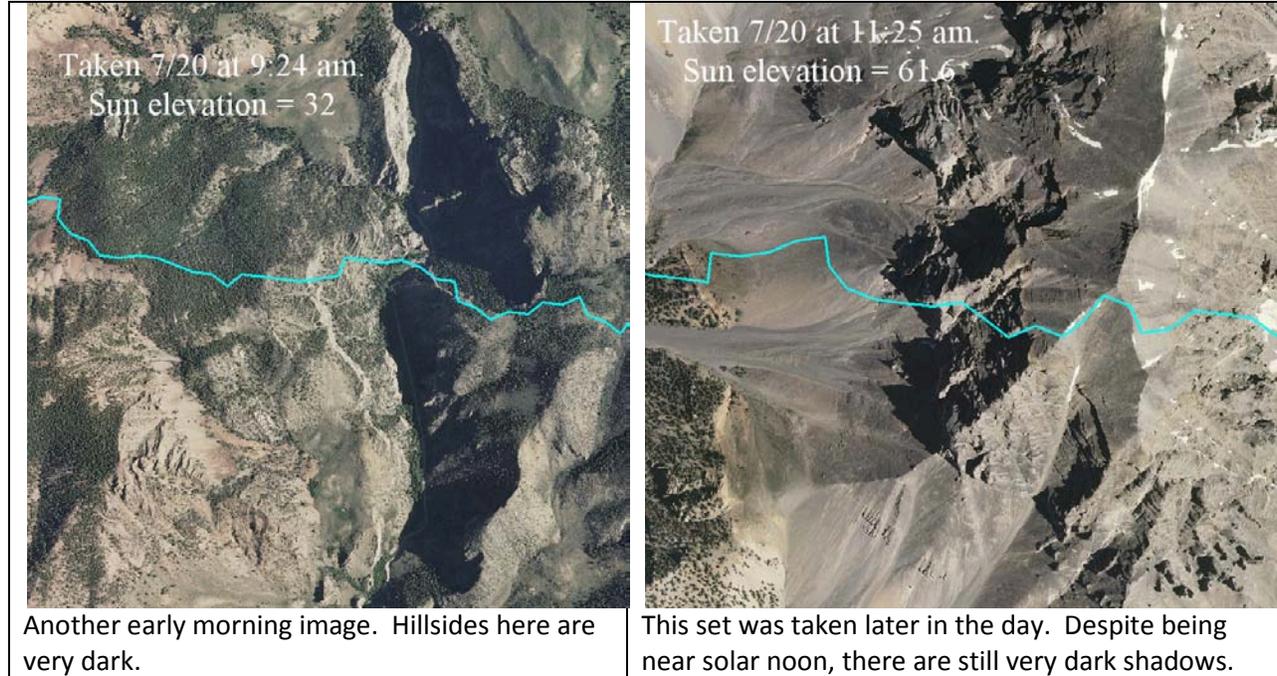


Taken 8/19 at 9:57 am.
Sun elevation = 33

Another comparison across different times. Note the tree shadows in the earlier image. This also shows that even later in the day, areas with lots of steep slopes can have problems with shadows.

Custer – part 2

7/15	14:17 – 14:22	65.9 – 65.7	Bad to OK	Ok if flat
7/20	9:20 – 10:16	31.3 – 41.3	Bad to OK	Ok if flat. Some hillsides dark.
	10:32 – 11:07	44 – 49.9	OK	Some steep hillsides dark
	11:19 – 13:44	51.9 – 66.2	Good	Occasional problems around outcrops
7/31	10:11 – 10:53	38.8 – 45.9	Bad to OK	Hillsides shaded, some dark. Long tree shadows
8/20	10:56 – 10:59	42.5 – 42.9	OK	Long shadows, especially on hillsides
	15:41 – 15:43	48.7 – 48.4	OK	Long shadows, especially on hillsides



Power

6/28	12:43 – 13:44	68 – 70.7	Good	n/a
	15:23 – 16:24	60.5 – 50.2	Bad to OK	Shaded hillsides. Trees & rocks leave shadows
7/15	11:15 – 12:45	53.6 – 66.3	Good	n/a
7/22	10:09 – 10:41	41.1 – 46.8	Bad to OK	Shaded hillsides. Trees & rocks leave shadows
	11:28 – 12:01	54.8 – 59.8	good	Some shading, but not bad