

Management and Succession at the Lick Creek Demonstration/Research Forest, Montana

Justin S. Crotteau, Sharon M. Hood, Duncan C. Lutes,
Christopher R. Keyes, Anna Sala, and Michael G. Harrington

The Lick Creek Demonstration/Research Forest is one of those places in the West that many foresters may not be familiar with by name but by photographs. Posters depicting forest change over the years circulated widely from the 1980s to 2000s, following Forest Service General Technical Reports from Gruell *et al.* (1982) and Smith and Arno (1999).

Lick Creek is located in the Bitterroot National Forest in southwestern Montana. This ponderosa pine forest (SAF Cover type 237; Eyre 1980) was home to the first large National Forest timber harvest in the region from 1906–11, directed by Elers Koch, Wilford White, and Gifford Pinchot (Gruell *et al.* 1982). The original sale cut 37.7 million board feet, and subsequent cutting in the 1950s and 1960s removed many of the remaining “overmature” overstory trees. Restoration treatments (1992–1923) in some parts of the forest were intended to recreate open stands dominated by large pines that typified this area prior to overstory removal and fire exclusion.

[Figure 1] In this photograph, two individuals sit in low understory beneath a well-stocked, old-growth ponderosa pine stand. Frequent, low-severity fire



Figure 1. Circa 1906. A virgin Lick Creek stand prior to harvest. Photo credit: USDA FS.

maintained this open stand structure, killing off most seedlings and saplings and promoting ponderosa pine dominance.

Received May 10, 2018; accepted June 8, 2018; published online August 20, 2018.

Affiliations: Justin S. Crotteau (jcrotteau@fs.fed.us), Christopher R. Keyes (christopher.keyes@umontana.edu), W.A. Franke College of Forestry and Conservation, University of Montana, 32 Campus Dr., Missoula, MT 59812. Sharon M. Hood (sharonmhood@fs.fed.us), Duncan C. Lutes (dlutes@fs.fed.us), Fire, Fuel, and Smoke Science Program, Rocky Mountain Research Station, USDA Forest Service, 5775 Highway 10 W, Missoula, MT 59808. Anna Sala (anna.sala@umontana.edu), Division of Biological Sciences, University of Montana, 32 Campus Dr., Missoula, MT 59812. Michael G. Harrington (m_garrington@q.com), Rocky Mountain Research Station, USDA Forest Service (Retired).

Acknowledgments: This was a study of the Applied Forest Management Program at the University of Montana, a research and demonstration unit of the Montana Forest and Conservation Experiment Station. Support was provided by the Joint Fire Science Program Project 15-1-07-30. George Gruell and Stephen Arno developed the pre-2015 photograph captions. Greg Munger helped develop the photo series in the appendix.

[Figure 2] This stand, just 30 miles from Lick Creek, is characterized by a more open canopy structure than the above Lick Creek photograph. Both Figures 1 and 2 are evidence that frequent fire in some areas of the intermountain West created open stands with large ponderosa pines and low understory.

In 1909, the Forest Service sent a Washington Office photographer to document the sale using a view box camera and glass plates. In 1925, many of the original photograph locations were relocated, and 13 were permanently monumented in 1938. Photographs from most of the photopoints were taken in 1909, 1925–1927, 1937–38, 1948, 1958, 1968, 1979, 1989, 1997, 2009, and 2015. These photographs were taken after the original 1906 harvest and clearly show evidence of subsequent harvesting; they are not intended to reflect pre-EuroAmerican conditions. Their value lies in showing how low-elevation ponderosa pine forests of the Northern Rockies change over with selective cutting of overstory pines and fire exclusion. Here, six photographs illustrate forest change over 106 years from each of two representative permanent photograph points. See the [Online Supplementary Data](#) for the full photo series from these two and the 12 remaining points.

Photopoint Four in the Lick Creek Drainage, Bitterroot National Forest

[Figure 3] 1909. Looking northeast through a heavily stocked ponderosa pine stand. The ground cover around C.H. Gregory (in the distance) and W.W. White (in the foreground) is a predominately herbaceous species with a high incidence of arrowleaf balsamroot (PSME/CARU-PIPO habitat type). The dark, low-growing shrub around White appear to be snowberry. Large willows are evident on the left edge of photograph and in front of White.¹



Figure 2. 1897. A virgin stand near the mouth of Overwhitch Creek. Photo credit: John Leiberg, US Geological Survey.



Figure 3. 1909. Photo credit: USDA FS Photo 86469.



Figure 4. 1938. Photo credit: USDA FS Photo 354400.

[Figure 5] 1958, 49 years after the 1909 picture was taken. Large pine behind center stump fell in 1940s. A shelterwood cut in 1952 removed several other merchantable trees and left slash on the ground. Bitterbrush appears on left edge of photograph.¹



Figure 5. 1958. Photo credit: USDA FS Photo 487747.



Figure 6. 1979. Photo credit: USDA FS.

[Figure 4] 1938, 29 years after the 1909 picture was taken. Young pine growth is beginning to occupy localized sites in understory. A tree on the right has blown down, and the willow in the foreground that was present in 1909 has become senescent. In foreground, the low shrub component is less evident, but this may be due to seasonal differences.¹

[Figure 6] 1979, 70 years after the 1909 picture was taken. A 1962 selection was cut, and 1966 precommercial thinning decreased stem densities, but rapid establishment and growth of new conifer cohort has filled in the open structure. Growing conditions for bitterbrush and willow have deteriorated because of competition from conifers for sunlight and moisture. Partial cutting and thinning in 1952, 1955, 1962, and 1966 have allowed more conifer regeneration than the early, light 1906–1909 cut.

[Figure 7] 1997, 88 years after the 1909 picture was taken. Douglas-fir regeneration that was established by the last photograph has rapidly developed, masking the view of the slower growing ponderosa pines in the background. Undergrowth is primarily pinegrass and dogbane.³



Figure 7. 1997. Photo credit: USDA FS.



Figure 8. 2015. Photo credit: USDA FS.

[Figure 8] 2015, 106 years after the 1909 picture was taken. Stumps from 1909 are still evident after more than a century. Although large ponderosa pine trees are still present in the overstory, Douglas-fir is dominating the midstory and understory. Without thinning and prescribed fire to replace the natural fire regime, Douglas-fir threatens ponderosa pine with succession. Under wildfire conditions, Douglas-fir threatens pine as a ladder fuel, forming a continuous fuel source from the understory to the remaining overstory pines.

Photopoint 13 in the Lick Creek Drainage, Bitterroot National Forest

[Figure 9] 1909. Open, park-like stand of ponderosa pine trees (*Pseudotsuga menziesii* *Vaccinium caespitosum* habitat type; Pfister et al. 1977). Light cutting at the time is evidenced by the few stumps and small slash piles. Undergrowth is largely herbaceous with low shrubs such as kinnikinnick and dwarf huckleberry. People shown are (left to right) Mrs. W.W. White, Charley Gregory (lumberman), and W.W. White.⁴



Figure 9. 1909. Photo credit: USDA FS Photo 86476.



Figure 10. 1938. Photo credit: USDA FS Photo 361706.

[Figure 11] 1958, 49 years after the 1909 picture was taken. Harvesting (1948) removed the large pines in center and left-center, as well as some other in the background. Understory Douglas-fir has become more conspicuous. Undergrowth still appears sparse.¹



Figure 11. 1958. Photo credit: USDA FS Photo 487745.



Figure 12. 1979. Photo credit: USDA FS.

[Figure 10] 1938, 29 years after the 1909 picture was taken. Overstory ponderosa pine remains about the same. Small pine and Douglas-fir are growing in scattered patches. Note the willow in the right-center, mid-ground and the less dense undergrowth (photograph possibly taken late in season).¹

[Figure 12] 1979, 70 years after the 1909 picture was taken. Understory was heavily thinned and overstory partially harvested in 1962, stimulating regeneration. Understory has developed into dense thickets of ponderosa pine and Douglas-fir.⁵

[Figure 13] 1997, 88 years after the 1909 picture was taken. Understory continued to develop, but then some overstory ponderosa pine was removed during 1992 selection harvesting. Patchy underburning in 1993 killed some conifers in the thickets. Ground cover is kinnikinnick, dwarf huckleberry, and pinegrass.⁶



Figure 13. 1997. Photo credit: USDA FS.



Figure 14. 2015. Photo credit: USDA FS.

[Figure 14] 2015, 106 years after the 1909 picture was taken. Mature overstory is no longer visible (though mature overstory and open understory are present just beyond this clump). Low understory vegetation has flourished since harvest and prescribed burn, but more Douglas-fir has established in the opening and will soon shade out the other species, as evident beneath the Douglas-fir clump on the right. Dense clump provides hiding cover for wildlife in an otherwise open stand.

Supplemental data

Supplementary data are available at *Journal of Forestry* online.

Endnotes

1. Caption from Gruell et al. (1982)
2. Caption from Gruell et al. (1982)
3. Caption from Smith and Arno (1999)
4. Caption from Gruell et al. (1982)

5. Caption from Gruell et al. (1982)
6. Caption from Smith and Arno (1999)

Literature Cited

- EYRE, F.H. 1980. *Forest cover types of the United States and Canada*. Society of American Foresters, Washington, DC. 148 p.
- GRUELL, G.F., W.C. SCHMIDT, S.F. ARNO, AND W.J. REICH. 1982. *Seventy years of vegetative change in a managed ponderosa pine forest in*

- western Montana*. USDA For. Serv. Gen. Tech. Rep. INT-GTR-130. Ogden, UT. 42 p.
- PEISTER, R.D., B.L. KOVALCHIK, S.F. ARNO, AND R.C. PRESBY. 1977. *Forest habitat types of Montana*. USDA For. Serv. Gen. Tech. Rep. INT-GTR-34. Ogden, UT. 174 p.
- SMITH, H.Y., AND S.F. ARNO. 1999. *Eighty-eight years of change in a managed ponderosa pine forest*. USDA For. Serv. Gen. Tech. Rep. RMRS-GTR-23. Fort Collins, CO. 55 p.

LICK CREEK DRAINAGE HISTORICAL PHOTOSERIES

BITTERROOT NATIONAL FOREST,
MONTANA

Appendix A

Crotteau, J.S., Hood, S.M., Lutes, D.C., Keyes, C.R., Sala, A., and Harrington, M.G. 2018. Management and succession at the Lick Creek Demonstration/Research Forest, Montana. *Journal of Forestry* 116(5):481–486.

This document showcases 14 points from the Lick Creek Demonstration/Research Forest where repeat photographs document forest change in the 106 years following harvesting, prescribed burning, and succession from 1909 to 2015. The Lick Creek site is a managed ponderosa pine forest, located in the Bitterroot Mountains within the Bitterroot National Forest. These photoseries document forest change typical of dry ponderosa pine forests in the West when fire is excluded. Original photographs are on file with the USDA Forest Service Rocky Mountain Research Station and available online at <https://doi.org/10.2737/RDS-2018-0023>.



**W.A. FRANKE COLLEGE OF
FORESTRY & CONSERVATION**
UNIVERSITY OF MONTANA



**Applied Forest Management Program
Forestry & Conservation Nursery**
Montana Forest & Conservation Experiment Station



PHOTOPOINT 1
1909 – 2015
LICK CREEK DRAINAGE
BITTERROOT NATIONAL FOREST,
MONTANA



1909



1925



1937



1948



1958



1968



1979



1989



1997



2009



2015

PHOTOPPOINT 1

1909 – 2015

LICK CREEK DRAINAGE

BITTERROOT NATIONAL FOREST, MONTANA

Camera faces southeast toward Lick Creek scaler's cabin and clearcut on private land in distance. Ground cover is largely herbaceous species with high incidence of lupine. Scattered patches of low shrubs are also evident (PSME/SYAL-CARU h.t.). Scattered willows occupy the more moist sites below Ranger Earl Turner. A few widely scattered young conifers are also evident. (USDA FS Photo 86467)

1909

16 Years Later. Establishment and growth of conifers has resulted in a marked change in the understory. Snag at the right center was a living tree in 1909. (USDA FS Photo 204817)

1925

28 Years Later. Former view is almost entirely screened by young ponderosa pine. The herbaceous understory does not appear to be as luxuriant as formerly. Willows in opening at left are considerably larger. (USDA FS Photo 354395)

1937

39 Years Later. Continued growth of conifers has resulted in complete closure of understory in midground. Snowberry shrubs are evident. (USDA FS Photo 452646)

1948

49 Years Later. Construction of system road has altered the soil surface in foreground. Shelterwood cut in 1952 is not apparent because of screening by young pine. (USDA FS Photo 487741)

1958

59 Years Later. A selection cut in 1962 and precommercial thinning in 1966 have opened the stand and allowed appreciable growth. Willows can be seen below road. (USDA FS Photo 518769)

1968

70 Years Later. View is once again screened by growth of young pines in foreground that established on scarified soil following logging. Bitterbrush behind camera point (not pictured) also regenerated as a result of disturbance. (USDA FS Photo)

1979

80 Years Later. Young pines and Douglas-fir now almost entirely block view of larger ponderosa pine trees in center and right background (seen well in 1968 photo). (USDA FS Photo)

1989

88 Years Later. No treatment is evident in this area since the 1960s. The young pines and Douglas-fir have now grown tall enough to allow some sight of larger trees in the background. The pines appear very spindly and overcrowded with Douglas-fir being more dominant than in 1989. (USDA FS Photo)

1997

100 Years Later. Proliferation of Douglas-fir foliage has again screened larger trees in the background. Young clump is so dense that only minimal stem growth is evident, while litter dominates the forest floor. (USDA FS Photo)

2009

106 Years Later. Douglas-firs at center of the clump have grown in diameter, outcompeting spindly pine in the foreground, which are bending further away from the clump. Live and dead needles and twigs in this clump present high hazard for torching. (USDA FS Photo)

2015

PHOTOPOINT 2
1909 – 2015
LICK CREEK DRAINAGE
BITTERROOT NATIONAL FOREST,
MONTANA



1909



1927



1937



1948



1958



1968



1979



1989



1997



2009



2015

PHOTOPPOINT 2
1909 – 2015
LICK CREEK DRAINAGE
BITTERROOT NATIONAL FOREST,
MONTANA

Looking southwest across open ponderosa pine dominated slopes from a point 75 yards above Photopoint 1 (dry extreme of PSME/CARU-PIPO h.t.). Original stand appears to have been quite open before logging. A deeply incised skid trail is evident in midground. A few widely scattered young conifers and willows are growing on slopes below. Recent analysis of stump at feet of Ranger Tanner shows evidence of 5 different wildfires prior to logging. (USDA FS Photo 86475)

1909

18 Years Later. Pine regeneration screen view, while some mature trees have fallen to the ground. An unidentified shrub now occupies site at right comer of photo. (USDA FS Photo 22 1277)

1927

28 Years Later. View is completely screened by heavily overstocked young pines. Pine at right center has died. Suppressed shrub at right comer of photo persists beneath canopy of young pines. (USDA FS Photo 354396)

1937

39 Years Later. Heavy stocking of young pines appears to have stagnated. Note fire mosaic on far slope that apparently occurred in 1875. Pine at left center has died. (USDA FS Photo 452645)

1948

49 Years Later. A shelterwood cut in 1952 removed tree at right and snag is also gone. Young pines have grown modestly despite heavy overstocking, while buildup of ground fuels is evident. (USDA FS Photo 487742)

1958

59 Years Later. Wyman Schmidt views selection cut in 1962 that removed the mature pine that had been present in left comer of photo since 1909. Precommercial thinning in 1966 has opened up foreground. Ground fuels have increased by addition of slash. Thinning has allowed leave trees to put on good growth. (USDA FS Photo 518776)

1968

70 Years Later. Thinning of the young pine stand has resulted in establishment of bitterbrush in left foreground and to right of old stump. Willows are also evident in foreground. Growth of young pines is accelerating. (USDA FS Photo)

1979

80 Years Later. Young pines continue to fill the understory. Willow in the foreground is barely visible and the bitterbrush seen in the 1979 photo is undetectable. (USDA FS Photo)

1989

88 Years Later. Harvesting in 1992 removed the mature pine present since the 1909 photo, along with the smaller pine to the left. No burning was conducted in this area in 1993. Undergrowth is primarily elk sedge. (USDA FS Photo)

1997

100 Years Later. Camera has pointed slightly left. Regenerated pine clump downslope has slowly increased in height. Understory fuels have slightly degraded. Willow is evident in the foreground. (USDA FS Photo)

2009

106 Years Later. Pine litter layer has increased. Bitterbrush is evident in front of regeneration clump. Stump from 1909 photograph is still evident at far right with downed branch resting on it. (USDA FS Photo)

2015

PHOTOPOINT 3

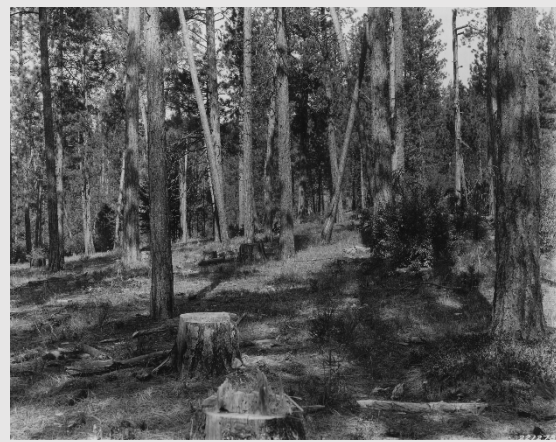
1909 – 2015

LICK CREEK DRAINAGE

BITTERROOT NATIONAL FOREST,
MONTANA



1909



1927



1937



1948



1958



1968



1979



1989



1997



2009



2015

PHOTOPoint 3

1909 – 2015

LICK CREEK DRAINAGE

BITTERROOT NATIONAL FOREST, MONTANA

A northwesterly view of cleanup operation following cutting in an open grown ponderosa pine (PSME/CARU- PIPO h.t.) stand. Although slash piles obstruct clear view, the understory apparently lacks shrubs. Perennial grasses and forbs predominate. (USDA FS Photo 86466)

1909

18 Years Later. Young Douglas-fir and ponderosa pine have become established in the background. A few young pine are also scattered through foreground. Willows 4-6 feet in height now occupy site at right midground of photo. Others of similar growth form are also evident. Kinnikinnick predominates at base of tree at right foreground. Litter is beginning to accumulate. (USDA FS Photo 22 I 278)

1927

28 Years Later. Ponderosa pine and Douglas-fir regeneration continues to close the understory in background. Growing conditions for young trees and willow have been enhanced by mortality and windthrown standing timber. Note growth of willow in right midground. Litter continues to accumulate. (USDA FS Photo 34440 I)

1937

39 Years Later. Growth of understory now obstructs view of background. Willow at right midground is obscured by young pines. (USDA FS Photo 452643)

1948

49 Years Later. A shelterwood cut was made in this general area in 1952 but its influence is not evident. Continued growth of young conifers has resulted in a thicker understory. The large willows at right are becoming senescent. Litter buildup is heavy. Debris may be the result of 1952 logging outside view of photo. Kinnikinnick continues to predominate at base of tree at right. (USDA FS Photo 487746)

1958

59 Years Later. A selection cut in 1962 and precommercial thinning in 1966 opened up the area considerably. Note decomposition of larger materials. Large willows at right contain many dead branches, but removal of young conifer competition has provided improved growing conditions. A bitterbrush shrub has become established near tree in right foreground. (USDA FS Photo 518768)

1968

70 Years Later. Overstory canopy is more closed as a result of the tree growth. Willows at right show some new growth. New willows are evident in foreground, while the one in front of tree at left which became established between 1909 and 1927 is slightly larger than in former years. Note the increased size of the bitterbrush plant. (USDA FS Photo)

1979

80 Years Later. The willow (center/right with the bitterbrush in front of it) appears to have fewer leaves and more dead branches. Note the increased size of the bitterbrush stems (right foreground) and the absence of the leaning tree from the center of the stand. (USDA FS Photo)

1989

88 Years Later. Harvesting in 1992 removed the large ponderosa pine at the right. This site was not underburned in 1993. Although the willows appear dead in the photo, they are alive at the base as is the bitterbrush (in the logging slash). Note the flush of lupine in the foreground. Additional ground cover is primarily kinnikinnick, elk sedge, and pinegrass. (USDA FS Photo)

1997

100 Years Later. Fine dead fuels from shrubs and slash have degraded in foreground. Diverse understory has maintained dominance, but released pine advance regeneration is now evident at right and near mature trees. (USDA FS Photo)

2009

106 Years Later. Willow, bitterbrush, and small pines have all grown taller. Logging slash has continued to degrade, but windthrown pine from 1930s still evident at midground right center. Note flagging (dead foliage) on sunlit overstory pine at right center. (USDA FS Photo)

2015

PHOTOPOINT 4
1909 – 2015
LICK CREEK DRAINAGE
BITTERROOT NATIONAL FOREST,
MONTANA



1909



1927



1938



1948



1958



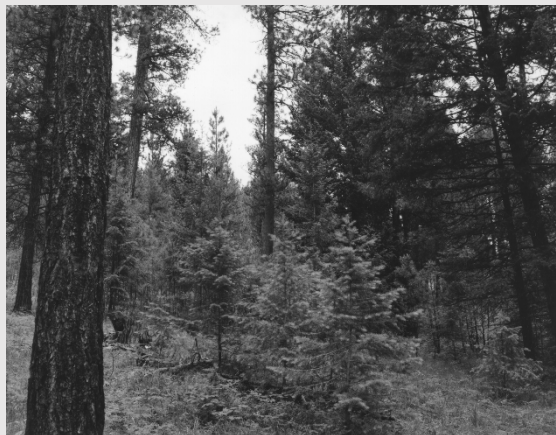
1968



1979



1989



1997



2009



2015

PHOTOPPOINT 4

1909 – 2015

LICK CREEK DRAINAGE

BITTERROOT NATIONAL FOREST,
MONTANA

Looking northeast through a more heavily stocked ponderosa pine stand at a point about one-half mile northeast of Photopoint 3. The ground cover around C.H. Gregory (in distance) and W.W. White is predominately herbaceous species with a high incidence of balsamroot (PSME/CARU-PIPO h.t.). The dark low-growing shrub around White appear to be snowberry. Large willows are evident on left edge of photo and in front of White. (USDA FS Photo 86469)

1909

18 Years Later. The two willows in the 1909 scene have grown considerably and now contain many dead branches. Other willows have become established in midground, while young ponderosa pine can be seen in localized areas. The herbaceous ground cover persists. Taken later in the season, this view pictures balsamroot at a cured stage of growth. Note fire-scarred stump on right. (USDA FS Photo 221280).

1927

29 Years Later. Young pine growth is beginning to occupy localized sites in understory. A tree on right has blown down, and the willow in foreground that was present in 1909 has become senescent. In foreground, the low shrub component is less evident, but this may be a seasonal difference. (USDA FS Photo 354400)

1938

39 Years Later. Two mature pines have fallen to ground. Growth of young pines are closing in portions of understory. Young pine at right foreground is screening senescent willow. Herbaceous plants and snowberry in foreground have put on good growth. (USDA FS Photo 452641)

1948

49 Years Later. A shelterwood cut in 1952 removed several of the merchantable trees and left slash on the ground. Plants occupying sites near left edge of photo appear to be bitterbrush. (USDA FS Photo 487747)

1958

59 Years Later. A 1962 selection cut and 1966 precommercial thinning have resulted in a more open stand with increasing slash on the ground. The bitterbrush plants are more evident, while willows in the midground have been favorably influenced by removal of young conifers. (USDA FS Photo 518770)

1968

70 Years Later. Rapid establishment and growth of new conifers has screened the open view of 1968. Growing conditions for bitterbrush and willow have deteriorated because of competition from conifers for sunlight and moisture. Partial cutting and thinning in 1952, 1955, 1962, and 1966 have allowed more conifer regeneration than the early, light 1906-09 cut. (USDA FS Photo).

1979

80 Years Later. The small trees established shortly before the 1979 photo have grown into a thicket of saplings. (USDA FS Photo)

1989

88 Years Later. This stand was not subject to management activities in 1992 and 1993. Note the rapid growth of the Douglas-fir trees in the foreground since 1989, masking the view of the slower growing ponderosa pines in the background. Undergrowth is primarily pinegrass and dogbane. (USDA FS Photo)

1997

100 Years Later. Understory vegetation begins to become sparser as dense Douglas-fir regeneration clumps continue to grow. (USDA FS Photo)

2009

106 Years Later. Douglas-fir saplings are growing rapidly. Tallest of the Douglas-fir in the background highlights the high fuel connectivity between large overstory pine crowns and small understory regeneration. (USDA FS Photo)

2015

PHOTOPOINT 5
1909 – 2015
LICK CREEK DRAINAGE
BITTERROOT NATIONAL FOREST,
MONTANA



1909



1927



1938



1948



1958



1968



1979



1989



1997



2009



2015

PHOTOPPOINT 5

1909 – 2015

LICK CREEK DRAINAGE

BITTERROOT NATIONAL FOREST,
MONTANA

The camera faces south-southeast toward Lick Creek. Camera location for Photopoint 6 is below and to the left. E.C. Clifford examines partial cut which opened up the ponderosa pine stand (PSME/CARU-PIPO h.t.). (Note clearcut in distance pictured in photopoint 6). Understory is predominantly perennial grasses with high incidence of balsamroot. A low-growing willow can be seen at left foreground, while widely scattered willows are evident in background. (USDA FS PHOTO 86473)

1909

18 Years Later. Ponderosa pine regeneration is profuse in midground. Willow in foreground has grown considerably, as has another on the left edge of photo behind tree. Down trees and broken-top pines (center and right) evidently resulted from wind damage after stand was opened. (USDA FS Photo 221281)

1927

29 Years Later. Young ponderosa pine growth continues at a modest rate. Although willow at left has not leafed out, it appears to contain dead branches. Gradual loss of overstory trees continues. (USDA FS Photo 361707)

1938

39 Years Later. Understory is now dominated by young ponderosa pine. The pine in center foreground that was apparently dead in 1938 has lost its bark, while the two trees to the right have toppled. Opening of the overstory may have improved conditions for herbaceous plants. (USDA FS Photo 452650)

1948

49 Years Later. Photo was taken too far to the left, but it does show that young ponderosa pine have grown well, considering that they are heavily overstocked. The increased canopy in foreground appears to be restricting growth of herbaceous plants. (USDA FS Photo 487743)

1958

59 Years Later. Construction of road in 1967 and overstory removal in 1968 resulted in considerable site modification. The willow in foreground of 1909 scene in front of William Chord had persisted despite heavy pine competition and is now of large growth form with little foliage near the ground. Mullein in foreground seeded in on disturbed soil. (USDA FS Photo 518774)

1968

70 Years Later. Opening of stand in 1968 allowed good growth of pines and release and establishment of willow. The large willow in foreground shows new growth near ground level from suckering. Spotted knapweed Dominates site in foreground. Far slope that was clearcut in 1909 is now covered by pole-size conifers. (USDA FS Photo)

1979

80 Years Later. Rapid growth of understory is evident. Note the difference in size of the young ponderosa pine at the left compared to 1979. Willow is still visible in the foreground. (USDA FS Photo)

1989

88 Years Later. Thinning in 1992 and a high consumption burn in 1993 have opened this stand. The burn was intended to thin the overstory. The ground cover is dominated by spotted knapweed. (USDA FS Photo)

1997

100 Years Later. Camera pointed considerably to the left of last frame. Youngest cohort is dominated by vigorous ponderosa pine. Knapweed is still a major component of the understory, evident in the foreground. (USDA FS Photo)

2009

106 Years Later. Note the significant height growth in the ponderosa pine saplings, as well as the lone Douglas-fir sapling at the far left of the frame. Native grasses are thriving in opening in the foreground. (USDA FS Photo)

2015

PHOTOPOINT 6
1909 – 2015
LICK CREEK DRAINAGE
BITTERROOT NATIONAL FOREST,
MONTANA



1909



1925



1938



1948



1958



1968



1979



1989



1997



2009



2015

PHOTOPPOINT 6

1909 – 2015

LICK CREEK DRAINAGE

BITTERROOT NATIONAL FOREST, MONTANA

The camera faces southeast in a ponderosa pine stand (PSME/CARU-PIPO h.t.) that has been selectively logged. W.W. White assesses the work. Understory vegetation is largely comprised of herbaceous species with balsamroot evident. Low shrubs in immediate foreground could not be identified. Note clearcut on private land in distance. (USDA FS Photo 86471)

1909

16 Years Later. Ponderosa pine seedlings have become established while willow is evident, particularly in area formerly covered by slash pile at right. Blowdown has occurred in foreground while distant slopes (in the clearcut) support tall shrubs and conifer regeneration. (USDA FS Photo 204818)

1925

29 Years Later. The open park-like appearance of the understory has been replaced by dense patches of young ponderosa pine. Willows have grown appreciably, but are not yet leafed out in this April scene. Blowdown of an occasional overstory pine is resulting in reduced crown cover. (USDA FS Photo 361708)

1938

39 Years Later. Growth of young ponderosa pine masks much of former view. Ground cover around Kenneth Boe is largely herbaceous species. Clearcut in distance now supports a developing conifer stand. Willows are suppressed. (USDA FS Photo 452648)

1948

49 Years Later. The camera has swung too far to the left. Increased development of the pine understory has created ladder fuels. Shading and litter accumulation apparently has inhibited herbaceous growth. (USDA FS Photo 487744)

1958

59 Years Later. Overstory removal in 1968 resulted in a stand that is dominated by young ponderosa pine. Foreground has been heavily scarified by tractor skidding. After 59 years, willow on edge of stand at left center of photo contains much dead material. (USDA FS Photo 518772)

1968

70 Years Later. Ponderosa pine growth response to overstory removal has been very good despite poor condition of some trees in 1968. Scarified soil in foreground allowed establishment of pine seedlings, bitterbrush, willow, pinegrass, and knapweed. (USDA FS Photo)

1979

80 Years Later. Understory pines have grown considerably. The willows do not appear as vigorous. (USDA FS Photo)

1989

88 Years Later. Shelterwood harvesting in 1992 and a high consumption burn in 1993 opened the stand. Small pines in left foreground and some in midground were killed by fire and beetle attacks. Willows in the right and left foreground sprouted following the fire and are still alive, but have been heavily browsed. Spotted knapweed and dogbane are the primary ground cover with some mullein. (USDA FS Photo)

1997

100 Years Later. Standing snags of all sizes have come down and surface fuels have compacted. Willow at right has been shaded out, but dead stems are still evident. Young ponderosa pines are rapidly increasing in height and closing canopy gaps. (USDA FS Photo)

2009

106 Years Later. Pine crowns have lifted even after a short growth period, reflecting increased canopy shading. Ground cover in foreground shows developing litter and cone layer. Bitterbrush is present in left midground. (USDA FS Photo)

2015

PHOTOPOINT 7

1909 – 2015

LICK CREEK DRAINAGE

BITTERROOT NATIONAL FOREST,
MONTANA



1909



1925



1938



1948



1958



1968



1979



1989



1997



2009



2015

PHOTOPPOINT 7

1909 – 2015

LICK CREEK DRAINAGE

BITTERROOT NATIONAL FOREST, MONTANA

Looking north across part of 1906 clearcut on private land. Photopoints 5 and 6 are in stands at right in distance. Foreground supported ponderosa pine and a higher Douglas-fir component than on other sites in the photo series (PSME/VAGL h.t.). Residual conifers below are mostly Douglas-fir. Scattered patches of aspen and willow have been released following logging. Slopes below support luxuriant ground cover of pinegrass and low shrubs. (USDA FS Photo 86479)

1909

16 Years Later. Conifer regeneration has developed more rapidly on north slope and valley bottom than on the distant south slope. Douglas-firs are mostly represented. Aspen and willow have grown profusely. Note large willow in foreground. (USDA FS Photo 204830)

1925

29 Years Later. Conifers now dominate slope below and valley bottom. Ponderosa pines that were not visible in 1925 are now apparent in immediate foreground. Most of south-facing slope in view now supports vigorous young forest except for a few openings, especially on convex slopes. Large willow in foreground has not leafed out. (USDA FS Photo 361705)

1938

39 Years Later. The original scene is now almost completely screened by vigorous young conifers. Willows in foreground are still in a healthy condition. (USDA FS Photo 452638)

1948

49 Years Later. Conifers show further height and diameter growth, whereas willow is declining. (USDA FS Photo 487749)

1958

59 Years Later. Precommercial thinning was carried out in 1968, but photo indicates insignificant removal on this site. Willows in foreground are leafed out and therefore more evident. (USDA FS Photo 518778)

1968

70 Years Later. Canopy appears less dense than in 1968. (USDA FS Photo)

1979

80 Years Later. Mid-story trees have grown to fill in the upper canopy. One willow shrub is still evident in the left mid-ground. (USDA FS Photo)

1989

88 Years Later. The stand seems more dense even though 3 overstory pines have fallen as a result of bark beetle attacks. These trees have created a fuel accumulation on the ground. The willow (left mid-ground) is no longer detectable, but a willow to right is now visible. Douglas-fir regeneration is evident. (USDA FS Photo)

1997

100 Years Later. Willow on right has been replaced by rapidly growing Douglas-fir saplings. Surface fuels in the gap on the left have begun degrading. (USDA FS Photo)

2009

106 Years Later. Douglas-fir seedlings and saplings continue to densify the forest, while surface fuels in gap have further assimilated into the forest floor. (USDA FS Photo)

2015

PHOTOPOINT 8
1909 – 2015
LICK CREEK DRAINAGE
BITTERROOT NATIONAL FOREST,
MONTANA



1909



1927



1937



1948



1958



1968



1979



1989



1997



2009



2015

PHOTOPPOINT 8

1909 – 2015

LICK CREEK DRAINAGE

BITTERROOT NATIONAL FOREST,
MONTANA

Looking east-southeast at a selection cut in primarily ponderosa pine (PSME/VACA h.t.). Pole-size Douglas-fir can be seen at right. Ground cover is herbaceous species with low shrubs and scattered small willows and snowberry. A large willow is growing in foreground on left. Charred log at the foot of W.W. White (center) and snag at left center of photo attest to past wildfire. E.C. Clifford, the first planting specialist in the Northern Region, is seated on a charred log. (USDA FS Photo 86470)

1909

18 years later. Willows are now a conspicuous part of the understory in mid-ground, while foreground has taken on a more grassy appearance. Douglas-fir and ponderosa pine regeneration are contributing to a much more developed understory than before. (USDA FS Photo 221285)

1927

28 Years Later. Young conifers are beginning to dominate the understory; willow has grown appreciably in midground. Litter accumulation is evident in foreground, while the tree canopy on the skyline is less dense because of mortality and windthrow. (USDA FS Photo 354397)

1937

39 Years Later. Willows are beginning to die back. Competition from young conifers is becoming intense. Litter accumulation in foreground includes a high incidence of pine cones. (USDA FS Photo 452649)

1948

49 Years Later. The open understory of 1909 has been replaced by a dense growth of young conifers. Willows are not leafed out, but nonetheless contain many dead branches. Although grasses persist in foreground, their growth seems to be inhibited because of accumulated litter. (USDA FS Photo 487748)

1958

59 Years Later. Precommercial thinning and pruning were carried out in 1968. The removal of trees in foreground, dozer scarification, and deposition of material from road construction resulted in establishment of mullein, thistle, and many ponderosa pine seedlings. Young willows can be seen at left center of photo. (USDA FS Photo 518771)

1968

70 Years Later. Photo documents how ponderosa pine can successfully regenerate on a disturbed (scarified) site. The ground cover in immediate vicinity is largely knapweed, dogbane, and Canada thistle, which are disturbance indicators. (USDA FS Photo)

1979

80 Years Later. Pines have grown considerably since 1979 photo. (USDA FS Photo)

1989

88 Years Later. Lower branches were scorched during burn treatment in 1993. Undergrowth is dominated by wild rye and spotted knapweed with dogbane and rose present in lesser quantities. Willows, although not obvious, are still alive but heavy browsing has kept them suppressed. (USDA FS Photo)

1997

100 Years Later. Overstory crowns have lifted above the frame. A number of pines were killed by the mountain pine beetle in the mid-2000s, some of which have already fallen to the ground. A few Douglas-fir seedlings are present in right background. Willow is no longer evident, but snowberry is now present at front center. (USDA FS Photo)

2009

106 Years Later. Overstory is slightly more broken up as more beetle-killed trees have dropped bark, needles, branches, and stems on the forest floor. Dogbane has reestablished in the new understory light conditions. (USDA FS Photo)

2015

PHOTOPOINT 9

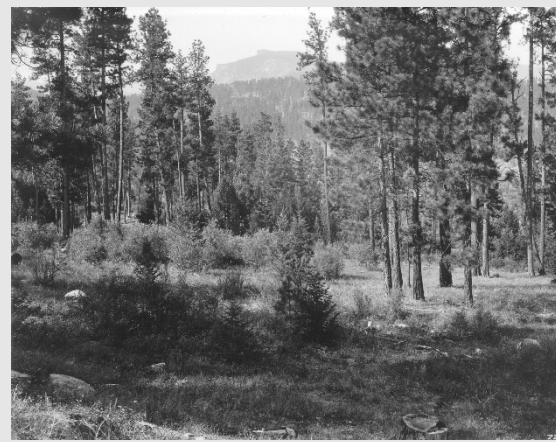
1909 – 2015

LICK CREEK DRAINAGE

BITTERROOT NATIONAL FOREST,
MONTANA



1909



1927



1938



1948



1958



1968



1979



1989



1997



2009



2015

PHOTOPPOINT 9
1909 – 2015
LICK CREEK DRAINAGE
BITTERROOT NATIONAL FOREST,
MONTANA

A northwest view back toward previous photopoints. Ground cover is comprised of herbaceous species including balsamroot and low-growing snowberry and spiraea (PSME/SYAL-CARU h.t.). Young Douglas-fir can be seen in understory. (USDA FS Photo 86478)

1909

18 Years Later. Willows are now predominant in opening at left in midground and are also evident in foreground. A few bitterbrush plants are also present in foreground. Douglas-fir regeneration is well established. (USDA FS Photo 221284)

1927

29 Years Later. Douglas-fir growth is competing with willow and bitterbrush. Both shrubs have grown considerably, but dead branches are particularly evident within the canopy of several willows. Note amount of dead material in willow at right edge of photo. (USDA FS Photo 361701)

1938

39 Years Later. Young Douglas-fir cohort has overtopped much of the shrub complement. A few bitterbrush and willow plants persist in openings, while snowberry is growing vigorously. (USDA FS Photo 456326)

1948

49 Years Later. Early skyline view has been completely screened by growth of conifers. Closure of understory has resulted in further deterioration of large shrubs. Note dead willow at left center of photo. (USDA FS Photo 487739)

1958

59 Years Later. Precommercial thinning in the 1960s resulted in improved conditions for willow, bitterbrush, and other understory plants. Slash has increased surface fuels. (USDA FS Photo 518777)

1968

70 Years Later. Growth of Douglas-fir screens view. These ladder fuels are beginning to create a hazard to second growth timber and the few trees left from the original stand. (USDA FS Photo)

1979

80 Years Later. Canopy has now become very dense, screening out the large pine in the center mid-ground. (USDA FS Photo)

1989

88 Years Later. Thinning in 1992 has opened the stand. Underburning in 1993 was light and spotty resulting in most small conifers surviving. Rose bushes are more vigorous, surrounding the willow in center mid-ground. (USDA FS Photo)

1997

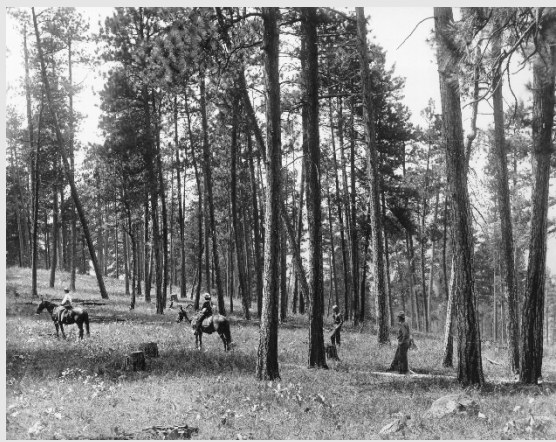
100 Years Later. Opening on the right is now being obstructed by pine sapling and thicket of Douglas-fir seedlings that had germinated just prior to the last photograph, now excluding low-growing shrubs and herbs that had thrived in the opening. (USDA FS Photo)

2009

106 Years Later. Thick Douglas-fir seedling patch on right, and full-crowned Douglas-fir in center continue to provide stark contrast to thin crowned ponderosa on right. Little has changed in the understory, rose patch is still evident in opening at left. (USDA FS Photo)

2015

PHOTOPOINT 10
1909 – 2015
LICK CREEK DRAINAGE
BITTERROOT NATIONAL FOREST,
MONTANA



1909



1925



1938



1948



1958



1968



1979



1989



1997



2009



2015

PHOTOPPOINT 10

1909 – 2015

LICK CREEK DRAINAGE

BITTERROOT NATIONAL FOREST,
MONTANA

Facing nearly due west from ridge northeast of Lake Como. Light selection cut in open ponderosa pine. Ground cover is comprised of perennial grasses and forbs, including balsamroot (PSME/CARU-PIPO h.t.). A few low-growing bitterbrush plants can be seen in the vicinity of horses and in distance on left. A group of willows can be seen behind horseman at left center. (USDA FS Photo 87357)

1909

16 Years Later. Bitterbrush plants on left and willow in distance, more evident in the winter scene, have increased in size. Young conifers are beginning to fill in the understory in the background. (USDA FS Photo 204815)

1925

29 Years Later. Several pines in foreground have been cut, some have died, and others have fallen to the ground. Ponderosa pine and Douglas-fir regeneration is profuse, while the willow in distance is larger. Bitterbrush has increased, but regeneration appears minimal. Slash and windfall have resulted in an increase in heavy fuels. Mullein can be seen in left foreground for the first time. (USDA FS Photo 361704)

1938

39 Years Later. Former open view is screened by growth of young conifers. Bitterbrush plants have continued to grow, but are beginning to receive competition from conifers for space. Willow in distance has been overtopped by conifers. Dead trees have toppled, adding to fuel load. Slash in foreground has decomposed somewhat, while balsamroot is not evident and mullein has increased in occurrence. (USDA FS Photo 452639)

1948

49 Years Later. Growth of young ponderosa pine and Douglas-fir dominate skyline, thereby obscuring view of the few remaining mature ponderosa pine in distance. Competition by young pines in foreground has apparently caused several of the bitterbrush plants to deteriorate. Heavy surface fuels show considerable decomposition. (USDA FS Photo 487738)

1958

59 Years Later. Precommercial thinning and pruning in 1968 removed mature pines and opened up young pine stand. This benefited some bitterbrush plants (reference to other photo sequences), but those in left foreground under and near leave trees show further deterioration. Slash has added to heavy fuels, while down material is more decomposed. (USDA FS Photo 518767)

1968

70 Years Later. Understory is dominated by increased pine growth that is shading out bitterbrush. Past disturbance has allowed knapweed to predominate in foreground. (USDA FS Photo)

1979

80 Years Later. Growth of trees in the foreground has reduced the view. A few bitterbrush plants can be seen in the center of the stand, along with some grasses. (USDA FS Photo)

1989

88 Years Later. Thinning in 1992 has created large openings throughout the stand. Only mid- and background received burn treatment in 1993 resulting in loss of small trees. Bitterbrush in unburned foreground looks more vigorous than others in burn area. Ground cover is dominated by spotted knapweed, elk sedge, and bluebunch wheatgrass. (USDA FS Photo)

1997

100 Years Later. Overstory in background has begun to fill in, while in the foreground crowns have lifted due to poor light conditions. Low vigor saplings at left have suffered from snowbend and have died or are dying due to competition. Bitterbrush has been shaded out. (USDA FS Photo)

2009

106 Years Later. Mountain pine beetle attacks have killed the nearby overstory trees on left, opening up the canopy. Some trees have already begun to fall and add fuel to the surface profile. Grasses are taking advantage of improved light conditions. (USDA FS Photo)

2015

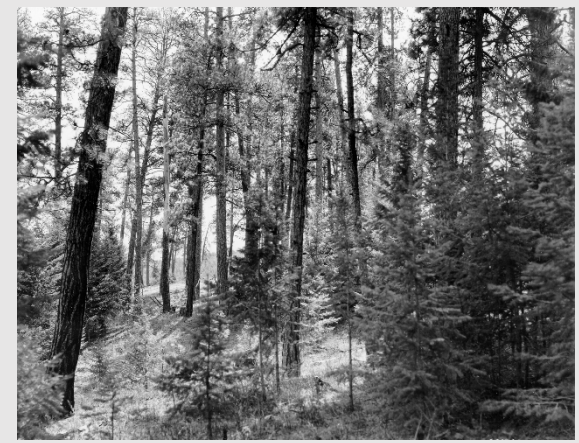
PHOTOPOINT 11
1909 – 2015
LICK CREEK DRAINAGE
BITTERROOT NATIONAL FOREST,
MONTANA



1909



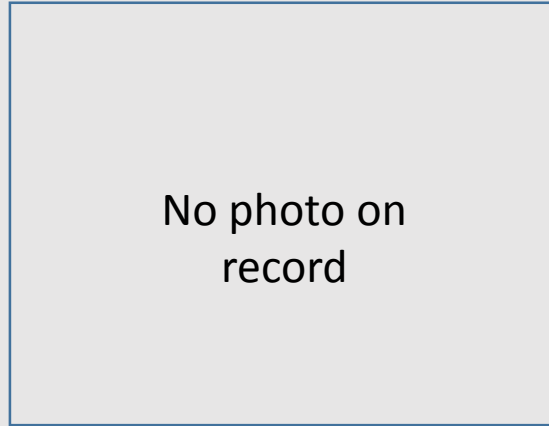
1927



1938



1948



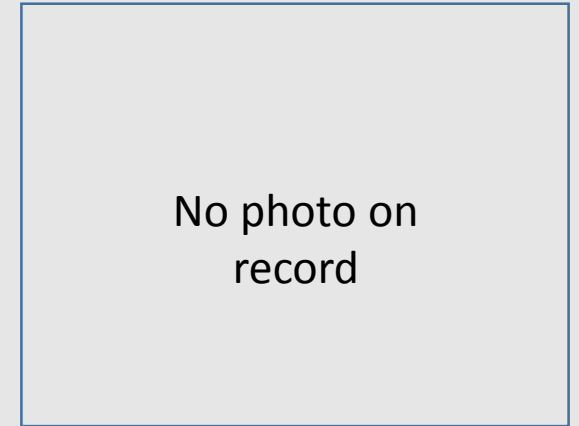
No photo on
record

1958



No photo on
record

1968



No photo on
record

1979



1989



1997



2009



2015

PHOTOPPOINT 11
1909 – 2015
LICK CREEK DRAINAGE
BITTERROOT NATIONAL FOREST,
MONTANA

View is south-southeast through an open ponderosa pine stand selectively cut in 1907 or 1908 (PSME/SYAL h.t.). Luxuriant grass/forb cover reflects pre-logging conditions. Note fire-scarred ponderosa pine and lone Douglas-fir seedling immediately to the left of W.W. White. A low-growing bitterbrush plant can be seen between White and stump. (USDA FS Photo 86480)

1909

18 years later. Douglas-fir regeneration has resulted in marked change in the understory. Grass/forb ground cover persists, but now bitterbrush and snowberry are more evident in foreground. Pine in stand is somewhat less dense because of culling or windfall. (USDA FS Photo 221282)

1927

29 Years Later. Douglas-fir understory continues to increase in size and density. Some overstory trees continue to die. (USDA FS Photo 361703)

1938

39 Years Later. Original view is now screened out by growth of young Douglas-fir. Ground cover in foreground now has considerable numbers of low shrubs. Snowberry appears to predominate. (USDA FS Photo 452640)

1948

No photo on record

1958

No photo on record

1968

No photo on record

1979

80 Years Later. This scene has changed considerably since the 1948 photo. Heavy thinning, probably in 1968, resulted in good regeneration of ponderosa pine. Willows are doing well in the center and right mid-ground. Undergrowth is primarily Kentucky bluegrass and pinegrass. (USDA FS Photo)

1989

88 Years Later. Young ponderosa pine in right midground have grown. Harvesting in 1992 removed overstory trees in background. Burning treatment in 1993 was very light as evidenced by surviving pine saplings and uncharred litter in foreground. Willows that were vigorous in 1989 are heavily browsed. (USDA FS Photo)

1997

100 Years Later. Douglas-fir overstory continues to dominate the foreground. Midground pines have continued to grow in height, though one pine at right center was killed by bark beetles. Willow at right has persisted, but willow to the left has been shaded out by Douglas-fir regeneration. (USDA FS Photo)

2009

106 Years Later. Frame has shifted slightly to exclude left-most pines. Little has changed except that young Douglas-firs are rapidly growing beneath pines at midground, acting as ladder fuels to connect surface and canopy fuel layers. (USDA FS Photo)

2015

PHOTOPOINT 12
1909 – 2015
LICK CREEK DRAINAGE
BITTERROOT NATIONAL FOREST,
MONTANA



1909



1925



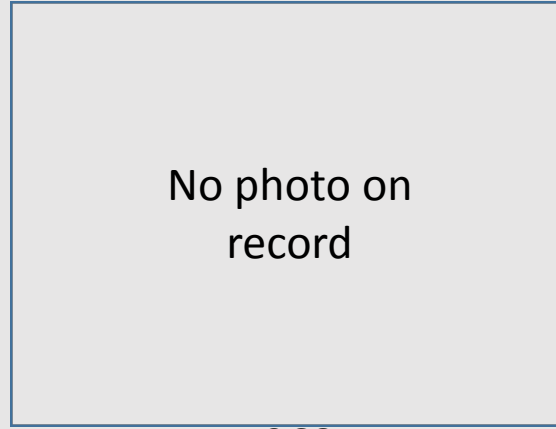
1937



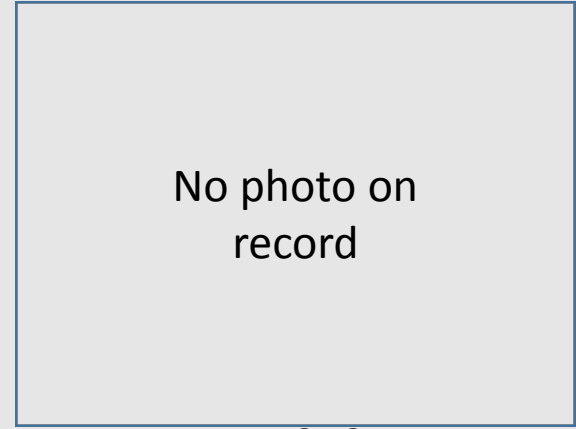
1948



1958



1968



1979



1989



1997



2009



2015

PHOTOPPOINT 12
1909 – 2015
LICK CREEK DRAINAGE
BITTERROOT NATIONAL FOREST,
MONTANA

Prior to harvest, the stand was fairly dense, dominated by pine (as evidenced by the stump and slash piles) with a few Douglas-fir (PSME/VACA h.t.). Undergrowth was primarily herbs and grasses. Note the willow to the right of the men. (USDA FS Photo 86472)

1909

16 Years Later. Douglas-fir and ponderosa pine regeneration is fairly heavy in patches. Note that the 2 large ponderosa pine in the center midground have been harvested. Willows have increased. (USDA FS Photo 204820)

1925

28 Years Later. Dense thicket of ponderosa pine and Douglas-fir has developed. Willows not visible in this photo. (USDA FS Photo 354398)

1937

39 Years Later. Large ponderosa pine in left center is almost obscured by thick understory. Young Douglas-fir are gaining dominance over the pines. (USDA FS Photo 452642)

1948

49 Years Later. Douglas-fir continues dominance over the pine. (USDA FS Photo)

1958

No photo on record

1968

No photo on record

1979

80 Years Later. Heavy thinning in 1968 favored retention of the pines. Regeneration is visible in foreground. Willows are visible in right/center foreground (not visible since 1925 photo). (USDA FS Photo)

1989

88 Years Later. This stand is now more open due to thinning in 1992 and underbuming in 1993 which removed much of the conifer regeneration seen in 1989 photo. Undergrowth is mostly pinegrass and kinnikinnick. (USDA FS Photo)

1997

100 Years Later. Douglas-fir has begun to regenerate in mid to background. Willow has not resprouted, but pinegrass in the understory is now supplemented by wildrye and knapweed. (USDA FS Photo)

2009

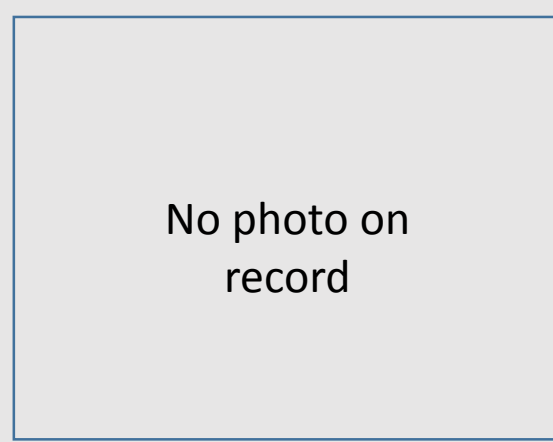
106 Years Later. Overstory has become more open as mountain pine beetles killed pines, some of which have fallen or been hung up on surviving trees. Mortality has provided additional light to the dense crop of Douglas-fir regeneration in the midground, which will replace the dead pine overstory. (USDA FS Photo)

2015

PHOTOPOINT 13
1909 – 2015
LICK CREEK DRAINAGE
BITTERROOT NATIONAL FOREST,
MONTANA



1909



1925



1938



1948



1958



1968



1979



1989



1997



2009



2015

PHOTOPPOINT 13

1909 – 2015

LICK CREEK DRAINAGE

BITTERROOT NATIONAL FOREST, MONTANA

Open, park-like stand of ponderosa pine trees (PSME/VACA h.t.). Light cutting at the time is evidenced by the few stumps and small slash piles. Undergrowth is largely herbaceous with low shrubs such as kinnikinnick and dwarf huckleberry. People are (L-R): Mrs. W.W. White, Charley Gregory (lumberman), W.W. White. (USDA FS Photo 86476)

1909

No photo
on record

1925

29 Years Later. Overstory ponderosa pine remains about the same. Small pine and Douglas-fir growing in scattered patches. Note the willow in right/center mid-ground and the less dense undergrowth (photo possibly taken late in season). (USDA FS Photo 361706)

1938

39 Years Later. Understory trees are more abundant with small openings in the forest. Pine in center has been marked (at base) for cutting. Undergrowth vegetation still fairly sparse. (USDA FS Photo 452647)

1948

49 Years Later. Harvesting removed the large pine in the center of the photo and the one to the left/center, as well as some others in the background. Understory Douglas-fir has become more conspicuous. Undergrowth still appears sparse. (USDA FS Photo 487745)

1958

59 Years Later. Fairly heavy thinning of understory trees and perhaps some overstory tree removal occurred during selection cutting in 1962. Regeneration of ponderosa pine following the thinning is seen in the foreground. (USDA FS Photo 518775)

1968

70 Years Later. Remarkable development of understory into dense thickets of ponderosa pine and Douglas-fir has occurred. (USDA FS Photo)

1979

80 Years Later. Continued development of understory thickets is seen with Douglas-fir increasing and becoming more dominant over the pines. (USDA FS Photo)

1989

88 Years Later. Some overstory ponderosa pine were removed during 1992 selection harvesting. Patchy underburning in 1993 killed some conifers in the thickets. Ground cover is kinnikinnick, dwarf huckleberry, and pinegrass. The view to the left and right of photo is much more open, similar to 1909. The stand is now multi-aged with a patch of large snags killed by beetles during the 1990s. (USDA FS Photo)

1997

100 Years Later. Mature overstory is no longer visible (though mature overstory and open understory is present just beyond this clump). In the foreground, kinnikinnick, dogbane, and pinegrass have flourished since prescribed burn. (USDA FS Photo)

2009

106 Years Later. More Douglas-fir has established in the opening and will soon shade out the other species, as evident beneath the Douglas-fir clump on the right. Dense clump provides hiding cover for wildlife in an otherwise open stand. Fire-killed trees have continued to degrade and be incorporated into the surface fuels. (USDA FS Photo)

2015

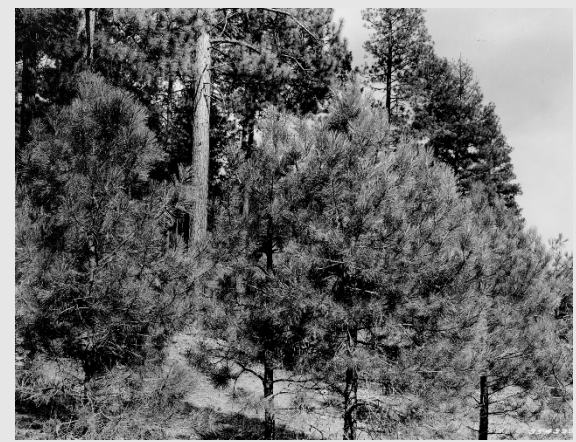
PHOTOPOINT 14
1909 – 2015
LICK CREEK DRAINAGE
BITTERROOT NATIONAL FOREST,
MONTANA



1909



1927



1937

No photo on
record

1948

No photo on
record

1958

No photo on
record

1968

No photo on
record

1979

No photo on
record

1989

No photo on
record

1997

No photo on
record

2009



2015

PHOTOPPOINT 14
1909 – 2015
LICK CREEK DRAINAGE
BITTERROOT NATIONAL FOREST,
MONTANA

This recently discovered photoseries was evidently located northwest of photopoint 4 near the present-day Lake Como-Lost Horse Loop Road. Photopoint is “300 yards north of cabin” in photopoint 1, and view is east. Stand was open-grown large ponderosa pines with a groundcover of bunchgrass and arrowleaf balsamroot. (USDA FS Photo 86474)

1909

18 Years Later. Late-September view with patches of saplings, willow shrub behind large tree at left, small bitterbrush shrub in left center, and a larger bitterbrush or willow in right-center. (USDA FS Photo 221279)

1927

28 Years Later. Late-September view largely obscured by the developing young pines. (USDA FS Photo 354399)

1937

No photo on record

1948

No photo on record

1958

No photo on record

1968

No photo on record

1979

No photo on record

1989

No photo on record

1997

No photo on record

2009

106 Years Later. Large overstory ponderosa pine is still present in center background, as are dense clumps of pine regeneration. Douglas-fir now occupies both overstory and understory positions in the midground. Thick litter layer covers grasses and dogbane in the open understory. (USDA FS Photo)

2015