

FINAL DRAFT
FIREMON Appendix

FIREMON
Appendix



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Appendix A: NRIS Damage Categories, Agents, Severity Ratings, and Tree Parts

Damage Categories Code	Description
00	None (default)
10	General insects
11	Bark beetles
12	Defoliators
13	Chewing insects
14	Sucking insects
15	Boring insects
16	Seed/cone/flower/fruit insects
17	Gallmaker insects
18	Insect predators
19	General diseases
20	Biotic damage
21	Root/butt diseases
22	Stem decays/cankers
23	Parasitic/epiphytic plants
24	Decline complexes/dieback/wilts
25	Foliage diseases
26	Stem rusts
27	Broom rusts
30	Fire
41	Wild animals
42	Domestic animals
50	Abiotic damage
60	Competition
70	Human activities
71	Harvest
80	Multi-damage (insect/disease)
90	Unknown
99	Physical effects

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Damage Agents

Category	Agent	Common Name
10	000	General Insects
<u>SEVERITY RATING</u>		
101 = minor		
102 = severe		
	001	Thrips
	007	Clerid beetle
	009	Green rose chafer
	017	Bagworm moth
	019	Scarab
	021	<i>Steremnius carinatus</i>
	023	Wood wasps
11	000	<u>Bark Beetles</u>
<u>SEVERITY RATING</u>		
111 = Unsuccessful bole attack: pitchout and beetle brood absent		
112 = Strip attacks: galleries and brood present		
113 = Successful bole attack: galleries and brood present		
114 = Topkill		
	001	Roundheaded pine beetle
	002	Western pine beetle
	005	Lodgepole pine beetle
	006	Mountain pine beetle
	007	Douglas-fir beetle
	009	Spruce beetle
	012	Red turpentine beetle
	013	<i>Dryocoetes affaber</i>
	015	Western balsam bark beetle
	016	<i>Dryocoetes sechelti</i>
	017	Ash bark beetles
	018	Native elm bark beetle
	021	Sixspined ips
	022	Emarginate ips
	024	<i>Ips latidens</i>
	026	Monterey pine ips
	028	Northern spruce engraver beetle
	029	Pine engraver
	030	Ips engraver beetles
	031	<i>Ips tridens</i>
	032	Western ash bark beetle
	034	<i>Orthotomicus caelatus</i>
	035	Cedar bark beetles
	036	Western cedar bark beetle
	037	Tip beetles
	038	Douglas-fir twig beetle
	039	Twig beetles
	040	Foureyed spruce beetle
	041	Fir root bark beetle

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Damage Agents (cont.)

Category	Agent	Common Name
11 (cont.)	000	Bark Beetles
	042	<i>Pseudohylesinus dispar</i>
	043	Douglas-fir pole beetle
	044	Silver fir beetle
	045	Small European elm bark beetle
	046	Spruce engraver
	048	True fir bark beetles
	049	Douglas-fir engraver
	050	Fir engraver
	053	Four-eyed bark beetle
	054	Hemlock beetle
12	000	<u>Defoliators</u>
<u>SEVERITY RATING</u>		
121 = Light defoliation (1-25%), no topkill		
122 = Light defoliation (1-25%), topkill <=10%		
123 = Light defoliation (1-25%), topkill >10%		
124 = Moderate defoliation (26-75%), no topkill		
125 = Moderate defoliation (26-75%), topkill <=10%		
126 = Moderate defoliation (26-75%), topkill >10%		
127 = Heavy defoliation (76-100%), no topkill		
128 = Heavy defoliation (76-100%), topkill <=10%		
129 = Heavy defoliation (76-100%), topkill >10%		
	001	Casebearer
	003	Looper
	005	Sawfly
	007	Larger elm leaf beetle
	008	Spanworm
	011	Western blackheaded budworm
	013	Whitefly
	014	Fall cankerworm
	015	Alder flea beetle
	016	Mountain mahogany looper
	018	Oak worms
	020	Western larch sawfly
	021	Fruit tree leafroller
	022	Uglynest caterpillar
	023	Boxelder defoliator
	030	Pear sawfly
	033	Boxelder leafroller
	035	Spruce webspinning sawfly
	036	Two-year budworm
	037	Large aspen tortrix
	039	Sugar pine tortrix
	040	Western spruce budworm
	043	Aspen leaf beetle
	044	Cottonwood leaf beetle
	045	Leafhopper
	046	Poplar tentmaker

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Damage Agents (cont.)

Category	Agent	Common Name
12 (cont.)	000	<u>Defoliators</u>
	047	Larch casebearer
	049	Lodgepole needleminer
	050	Ponderosa needleminer
	051	Black Hills Pandora moth
	052	Pandora moth
	053	Sycamore lace bug
	054	Lace bugs
	055	Oak leaftier
	058	Yellownecked caterpillar
	059	Walkingstick
	060	Spruce coneworm
	061	Introduced pine sawfly
	066	White fir needleminer
	071	Elm leafminer
	072	Geometrid moth
	073	Leafblotch miner
	074	Spotted tussock moth
	077	Brown day moth
	082	Fall webworm
	083	Hemlock looper
	085	Tent caterpillar moth
	086	Satin moth
	087	Willow leafblotch miner
	088	Aspen blotchminer
	089	Gypsy moth
	090	Cottonwood leafminers
	094	Western tent caterpillar
	096	Forest tent caterpillar
	098	Leafcutting bees
	099	Blister beetle
	102	Willow sawfly
	104	Lodgepole sawfly
	106	Pine infesting sawflies
	109	Ponderosa pine sawfly
	115	Hemlock sawfly
	116	Pine butterfly
	117	False hemlock looper
	118	California tortoiseshell
	120	Bruce spanworm
	121	Rusty tussock moth
	122	Whitemarked tussock moth
	123	Douglas-fir tussock moth
	124	Western tussock moth
	125	Spring cankerworm
	135	Aspen leafminer
	136	Yellowheaded spruce sawfly
	137	Tenlined June beetle

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Damage Agents (cont.)

Category	Agent	<u>Common Name</u>
12 (cont.)	000	Defoliators
	138	Japanese beetle
	139	Larch sawfly
	140	Mountain –ash sawfly
	141	Elm leaf beetle
	142	Spearmarked black moth
	143	Giant silkworm moth
	144	Redhumped caterpillar
	146	Larch looper
	150	Spruce needleminer (west)
	154	<i>Thyridopteryx ephemeraeformis</i>
	155	Leafroller/seed moth
	156	Willow defoliation
	157	Euonymus caterpillar
	159	Larch bud moth
	160	Pine needle sheathminer
	162	Cottonwood leaf beetle
	164	Saddle-backed looper
	165	Leaf roller
	168	Green-striped looper
	174	Pine looper
	176	<i>Zadiprion townsendi</i>
	177	Douglas-fir budmoth
	179	Phantom hemlock looper
	180	Tent caterpillar
	188	Elm sawfly
	189	June beetles/leaf chafers
13	000	<u>Chewing Insects</u>
<u>SEVERITY RATING</u>		
131 = minor		
132 = severe		
	001	Grasshopper
	002	Shorthorn grasshoppers
	005	Clearwinged grasshopper
	006	Cicadas
	007	Eurytomids
	008	Cutworms
	010	Pales weevil
	012	Periodical cicada
	013	Migratory grasshopper
	014	Valley grasshopper
	015	Strawberry root weevil
	020	Northern pitch twig moth
	021	Ponderosa pine tip moth
	022	Pine needle weevil
	025	<i>Thrips madronii</i>
	026	Ash plant bug
	028	Pitch-eating weevil

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Damage Agents (cont.)

Category	Agent	Common Name
14	000	Sucking Insects
<u>SEVERITY RATING</u>		
141 = minor		
142 = severe		
	001	Scale insect
	002	Western larch woolly aphid
	003	Balsam woolly adelgid
	004	Hemlock woolly adelgid
	006	Aphid
	008	Western pine spittlebug
	010	Spittlebug
	012	Pine needle scale
	014	Giant conifer aphids
	017	Spruce aphid
	018	Woolly apple aphid
	022	Pine thrips
	026	Lecanium scale
	028	Oystershell scale
	029	Pinyon needle scale
	030	Ponderosa pine twig scale
	035	Treehoopers
	039	Black pineleaf scale
	040	Spruce spider mite
	043	Maple aphids
	044	Spruce bud scale
	046	Pine leaf adelgid
	047	White pine adelgid
	048	Pine bark adelgid
	049	Root aphid
	050	Mealybug
	051	Cottony maple scale
	052	Fir mealybug
	053	Douglas-fir mealybug
	061	Pine tortoise scale
	063	Birch aphid
	068	European elm scale
15	000	Boring Insects
<u>SEVERITY RATING</u>		
151 = minor, 152 = severe		
	001	Shoot borer
	002	Termite
	003	Ponderosa pine bark borer
	004	Bronze birch borer
	006	Bronze poplar borer
	007	Carpenter bees
	008	Flatheaded borer
	009	Golden buprestid
	010	Carpenter ants

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Damage Agents (cont.)

Category	Agent	Common Name
15 (cont.)	000	Boring Insects
	011	Gouty pitch midge
	012	Shootboring sawflies
	013	Roundheaded borer
	014	Flatheaded apple tree borer
	017	Pitted ambrosia beetle
	018	Carpenterworm moths
	019	Poplar and willow borer
	020	Pine reproduction weevil
	021	Douglas-fir twig weevil
	027	Ponderous borer
	029	Western pine shoot borer
	030	Eucosma species
	034	Warren's collar weevil
	035	Powderpost beetle
	036	Tarnished plant bug
	037	<i>Magdalis spp.</i>
	038	White pine bark miner
	039	Locust borer
	040	California flathead borer
	041	Flatheaded fir borer
	042	Whitespotted sawyer
	043	Redheaded ash borer
	045	Oberea shoot borers
	048	<i>Pissodes dubius</i>
	050	White pine weevil
	051	Lodgepole terminal weevil
	052	Ambrosia beetles
	053	Cottonwood borer
	056	Ash borer
	057	Lilac borer
	058	<i>Prionoxystus robiniae</i>
	059	Maple shoot borers
	060	Western subterranean termite
	063	European pine shoot moth
	064	Western pine tip moth
	065	Nantucket pine tip moth
	066	Lodgepole pine tip moth
	067	Southwestern pine tip moth
	070	Saperda shoot borer
	071	Clearwing moths
	073	Roundheaded fir borer
	074	Western larch borer
	075	Western cedar borer
	076	Douglas-fir pitch moth
	077	Sequoia pitch moth
	083	Ottonwood twig borer
	085	Banded ash borer

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Damage Agents (cont.)

Category	Agent	Common Name
16	000	<u>Seed/Cone/Flower/Fruit Insects</u>
<u>SEVERITY RATING</u>		
161 = minor		
162 = severe		
	001	Douglas-fir cone moth
	002	Lodgepole cone beetle
	003	Limber pine cone beetle
	004	Mountain pine cone beetle
	005	Ponderosa pine cone beetle
	010	Douglas-fir cone midge
	011	Cone scale midge
	012	Pecan
	015	Fir coneworm
	017	Pine coneworm
	019	Ponderosa twig moth
	020	<i>Dioryctria pseudotsugella</i>
	021	Dioryctria moths
	022	Lodgepole cone moth
	023	Seed chalcid
	025	Cone maggot
	027	Ponderosa pine seed worm/moth
	028	Spruce seed moth
	029	Boxelder bug
	031	Western conifer seed bug
	033	<i>Magastigmus lasiocarpae</i>
	034	Spruce seed chalcid
	035	Ponderosa pine seed chalcid
	036	Fir seed chalcid
	037	Douglas-fir seed chalcid
	040	Roundheaded cone borer
	042	Coneworm
	043	Harvester ants
	048	Coneworm
	049	Prairie tent caterpillar
17	000	<u>Gallmaker Insects</u>
<u>SEVERITY RATING</u>		
171 = minor		
172 = severe		
	003	Cooley spruce gall adelgid
	006	Gall midge
	007	Douglas-fir needle gall midge
	008	Gall mite
	009	Spruce gall midge
	013	Gall aphid
	014	Alder gall mite
	015	Psyllid
	018	Gouty pitch midge
	019	Spider mites

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Damage Agents (cont.)

Category	Agent	Common Name
18	000	<u>Insect Predators</u>
<u>SEVERITY RATING</u> 181 = minor 182 = severe		
	001	Lacewing
	002	Blackbellied clerid
	003	Redbellied clerid
	005	Western yellowjacket
19	000	<u>General Diseases</u>
<u>SEVERITY RATING</u> 191 = minor 192 = severe		
20	000	<u>Biotic Damage</u>
<u>SEVERITY RATING</u> 201 = minor 202 = severe		
	001	Damping off
	002	Gray mold
21	000	<u>Root/Butt Diseases</u>
<u>SEVERITY RATING for trees</u> 211 = Tree within 30 feet of tree with deteriorating crown, tree with diagnostic symptoms or signs, or tree killed by root disease 212 = Pathogen (sign) or diagnostic symptom detected - no crown deterioration 213 = Crown deterioration detected - no diagnostic symptoms or signs 214 = Both crown deterioration and diagnostic signs symptoms detected		
	001	Armillaria root disease
	003	Cylindrocladium root disease
	004	Brown crumbly rot
	006	Fusarium root rot
	007	White mottled rot
	009	Ganoderma rot of conifers
	010	Annosus root disease
	012	Tomentosus root disease
	014	Black stain root disease
	015	Schweinitzii butt rot
	017	Laminated root rot
	022	Pythium root rot
	026	Yellow pitted rot

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Damage Agents (cont.)

Category	Agent	Common Name
22	000	<u>Stem Decays</u>
<u>SEVERITY RATING</u>		
220 = 0-4% rotten		225 = 46-55% rotten
221 = 5-15% rotten		226 = 56-65% rotten
222 = 16-25% rotten		227 = 66-75% rotten
223 = 26-35% rotten		228 = 76-85% rotten
224 = 36-45% rotten		229 = 86-100% rotten
	001	Heart rot
	002	Stem rot
	003	Sap rot
	006	Black knot of cherry
	007	Atropellis canker
	012	Black canker of aspen
	024	Gray-brown saprot
	025	Cryptosphaeria canker of aspen
	026	Cytospora canker of fir
	027	Western red rot
	028	Rust-red stringy rot
	029	Sooty-bark canker
	035	Amelanchier rust
	036	Cedar apple rust
	038	Hypoxyton canker of aspen
	040	Sterile conk trunk rot of birch
	047	Red ring rot
	048	Aspen trunk rot
	051	Phomopsis canker
	057	Cytospora canker of aspen
	059	Red belt fungus
	062	Brown heartrot
	063	<i>Coniophora puteana</i>
	064	Tinder fungus
	065	Purple conk
	066	<i>Leptographium wagnerii</i>
	067	<i>Phellinus hartigii</i>
	068	False tinder fungus
	070	Yellow cap fungus
	071	Oyster mushroom
	074	Cedar brown pocket rot
	075	Lanchnellula canker
	077	Phomopsis blight

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Damage Agents (cont.)

Category	Agent	Common Name
23	000	<u>Parasitic</u>
<u>SEVERITY RATING</u>		
231 = Hawksworth tree DMR rating 1		
232 = Hawksworth tree DMR rating 2		
233 = Hawksworth tree DMR rating 3		
234 = Hawksworth tree DMR rating 4		
235 = Hawksworth tree DMR rating 5		
236 = Hawksworth tree DMR rating 6		
	001	Mistletoe
	003	Vine damage
	006	Lodgepole pine dwarf mistletoe
	008	Western dwarf mistletoe
	009	Limber pine dwarf mistletoe
	011	Douglas-fir dwarf mistletoe
	013	Larch dwarf mistletoe
24	000	<u>Decline Complexes/Dieback/Wilts</u>
<u>SEVERITY RATING</u>		
241 = minor		
242 = severe		
	004	Ash decline/yellow
	022	Dutch elm disease
25	000	<u>Foliage Diseases</u>
<u>SEVERITY RATING</u>		
251 = minor		
252 = severe		
	001	Blight
	002	Broom rust
	003	Juniper blights
	004	Leaf spots
	005	Needlecast
	006	Powdery mildew
	009	True fir needlecast
	013	Large-pored spruce-laborador tea rust
	014	Ink spot of aspen
	015	Pine needle rust
	019	Cedar leaf blight
	020	Dogwood anthracnose
	022	Elytroderma disease
	023	Fire blight
	027	Brown felt blight
	028	Larch needle blight
	031	Spruce needle cast
	032	Fir needle cast
	033	White pine needle cast
	034	Lophodermella needle cast
	035	Lophodermium needle cast
	036	Marssonina blight

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Damage Agents (cont.)

Category	Agent	Common Name
25 (cont.)	000	Foliage Diseases
	037	Melampsora rusts
	039	Larch needle cast
	040	Dothistroma needle blight
	041	Brown felt blight of pines
	042	Snow blight
	043	Swiss needle cast
	049	Fir needle rust
	050	Douglas-fir needle cast
	052	Rhizophaeria needle cast
	054	Brown spot needle blight
	056	Septoria leaf spot and canker
	058	Diplodia blight
	061	Shepherd's crook
	062	Dothistroma needle blight
	064	Broom rust
	065	Spruce needle rust
	067	Spruce needle cast
	068	Hardwood leaf rusts
	072	Sirococcus shoot blight
	073	Shepherds crook
	074	Delphinella shoot blight
26	000	<u>Stem Rusts</u>
<u>SEVERITY RATING</u>		
261 = Branch infections located greater than 2 feet from tree bole.		
262 = Branch infections located between 6 inches and 2 feet from tree bole.		
263 = Bole infections or branch infections located within 6 inches of bole.		
264 = Topkill.		
	001	White pine blister rust
	002	Western gall rust
	003	Stalactiform blister rust
	004	Comandra blister rust
	011	Bethuli rust
27	000	<u>Broom Rusts</u>
<u>SEVERITY RATING</u>		
271 = minor		
272 = severe		
	001	Spruce broom rust
	003	Juniper broom rust
	004	Fir broom rust
30	000	<u>Fire</u>
<u>SEVERITY RATING</u>		
301 = minor		
302 = severe		

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Damage Agents (cont.)

Category	Agent	<u>Common Name</u>
41	000	<u>Wild Animals</u>
<u>SEVERITY RATING</u>		
411 = minor		
412 = severe		
	001	Bear
	002	Beaver
	003	Big game
	004	Mice or voles
	005	Pocket gophers
	006	Porcupines
	007	Rabbits or hares
	008	Sapsucker
	009	Squirrels
	010	Woodpeckers
	011	Moose
	012	Elk
	013	Deer
	014	Feral pigs
42	000	<u>Domestic Animals</u>
<u>SEVERITY RATING</u>		
421 = minor		
422 = severe		
	001	Cattle
	002	Goats
	003	Horses
	004	Sheep
50	000	<u>Abiotic Damage</u>
<u>SEVERITY RATING</u>		
501 = minor		
502 = severe		
	001	Air pollutants
	002	Chemical
	003	Drought
	004	Flooding/high water
	005	Frost
	006	Hail
	007	Heat
	008	Lightning
	009	Nutrient imbalances
	010	Radiation
	011	Snow/ice
	012	Wild fire
	013	Wind/tornado
	014	Winter injury
	015	Avalanche
	016	Mud/land slide

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Damage Agents (cont.)

Category	Agent	Common Name
60	000	Competition
<u>SEVERITY RATING</u> 601 = minor 602 = severe		
70	000	<u>Human Activities</u>
<u>SEVERITY RATING</u> 701 = minor 702 = severe		
	001	Herbicides
	002	Human caused fire
	003	Imbedded objects
	004	Improper planting technique
	005	Land clearing
	006	Land use conversion
	007	Logging damage
	008	Mechanical
	009	Pesticides
	010	Roads
	011	Soil compaction
	012	Suppression
	013	Vehicle damage
	014	Road salt
71	000	<u>Harvest</u>
<u>SEVERITY RATING</u> 711 = minor 712 = severe		
80	000	Multi-Damage (Insect/Disease)
<u>SEVERITY RATING</u> 801 = minor 802 = severe		
	001	Aspen defoliation (12037,12096, 25036 and 25037)
	002	Subalpine fir mortality (11015, 21001, 21010, 50014) disturbances
90	000	Unknown
<u>SEVERITY RATING</u> 900 = 0 – 9% affected 901 = 10 – 19% affected 902 = 20 – 29% affected 903 = 30 – 39% affected 904 = 40 - 49% affected 905 = 50 - 59% affected 906 = 60 - 69% affected 907 = 70 - 79% affected 908 = 80 - 89% affected 909 = 90 - 100% affected		

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Damage Agents (cont.)

99	000	Physical Effects	How to code Severity (actual %)
These severities do not need to be preceded by the category code of 99. Only the actual percentage needs to be recorded.			
	000	Unknown	
	001	Broken top	% of missing height
	002	Dead top	% of dead height
	003	Limby (large limbs top to bottom)	% of bole with many limbs/knots
	004	Forked top	% of height above fork
	005	Forked below merch top	% of bole affected
	006	Crook or sweep	% of bole affected
	007	Checks, bole cracks	% of bole affected
	008	Foliage discoloration	% of foliage discolored
	010	Lack of seed source	NA
	011	Poor planting stock	NA
	012	Poor growth	NA
	013	Total board foot volume loss	
	014	Total cubic foot volume loss	
	015	Bark removal	
	016	Foliage loss	
	017	Sunscald	
	018	Uproot	
	019	Scorched foliage	
	020	Scorched bark	
	021	Dieback	
	022	Poor crown form	

Tree Parts

Code	Description
UN	Unspecified
TO	Top
FO	Foliar (Crown)
LI	Limb
BO	Bole, other than Top or Base
BA	Base
RO	Roots
WT	Whole Tree
TT	Top Third of Crown
MT	Middle Third of Crown
BT	Bottom Third of Crown
TA	Above merch top
TB	Below merch top

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Appendix B. NRIS Lithology Codes

<u>Primary Code</u>	<u>Primary Lithology</u>	<u>Secondary Code</u>	<u>Secondary Description</u>
<u>IGEX</u>	<u>Igneous Extrusive</u>	<u>ANDE</u>	<u>Andesite</u>
	<u>Igneous Extrusive</u>	<u>BASA</u>	<u>Basalt</u>
	<u>Igneous Extrusive</u>	<u>LATI</u>	<u>Latite</u>
	<u>Igneous Extrusive</u>	<u>RHYO</u>	<u>Rhyolite</u>
	<u>Igneous Extrusive</u>	<u>SCOR</u>	<u>Scoria</u>
	<u>Igneous Extrusive</u>	<u>TRAC</u>	<u>Trachyte</u>
<u>IGIN</u>	<u>Igneous Intrusive</u>	<u>DIOR</u>	<u>Diorite</u>
	<u>Igneous Intrusive</u>	<u>GABB</u>	<u>Gabbro</u>
	<u>Igneous Intrusive</u>	<u>GRAN</u>	<u>Granite</u>
	<u>Igneous Intrusive</u>	<u>QUMO</u>	<u>Quartz Monzonite</u>
	<u>Igneous Intrusive</u>	<u>SYEN</u>	<u>Syenite</u>
	<u>Metamorphic</u>	<u>GNEI</u>	<u>Gneiss</u>
	<u>Metamorphic</u>	<u>PHYL</u>	<u>Phyllite</u>
	<u>Metamorphic</u>	<u>QUAR</u>	<u>Quartzite</u>
	<u>Metamorphic</u>	<u>SCHI</u>	<u>Schist</u>
	<u>Metamorphic</u>	<u>SLAT</u>	<u>Slate</u>
<u>SEDI</u>	<u>Sedimentary</u>	<u>ARGI</u>	<u>Argillite</u>
	<u>Sedimentary</u>	<u>CONG</u>	<u>Conglomerate</u>
	<u>Sedimentary</u>	<u>DOLO</u>	<u>Dolomite</u>
	<u>Sedimentary</u>	<u>LIME</u>	<u>Limestone</u>
	<u>Sedimentary</u>	<u>SANS</u>	<u>Sandstone</u>
	<u>Sedimentary</u>	<u>SHAL</u>	<u>Shale</u>
	<u>Sedimentary</u>	<u>SILS</u>	<u>Siltstone</u>
	<u>Sedimentary</u>	<u>TUFA</u>	<u>Tufa</u>
<u>UNDI</u>	<u>Undifferentiated</u>	<u>MIEXME</u>	<u>Mixed Extrusive and Metamorphic</u>
	<u>Undifferentiated</u>	<u>MIEXSE</u>	<u>Mixed Extrusive and Sedimentary</u>
	<u>Undifferentiated</u>	<u>MIIG</u>	<u>Mixed Igneous (extrusive & intrusive)</u>
	<u>Undifferentiated</u>	<u>MIIGME</u>	<u>Mixed Igneous and Metamorphic</u>
	<u>Undifferentiated</u>	<u>MIIGSE</u>	<u>Mixed Igneous and Sedimentary</u>
	<u>Undifferentiated</u>	<u>MIINME</u>	<u>Mixed Intrusive and Metamorphic</u>
	<u>Undifferentiated</u>	<u>MIINSE</u>	<u>Mixed Intrusive and Sedimentary</u>
	<u>Undifferentiated</u>	<u>MIMESE</u>	<u>Mixed Metamorphic and Sedimentary</u>

Appendix C: NRIS Landform Codes.

Landform	Code	Landform	Code
Alluvial Fan	ALFA	Nivation hollow	NIHO
Alluvial Flat	ALFL	Plateau	PLAT
Avalanche talus	AVTA	Ridge	RIDG
Break	BREA	Stream	STRE
Cirque	CIRQ	Stream Terrace	STTE
Dip slope	DISL	Structural	STRU
Drumlin	DRUM	Structural Bench	STBE
Kame	KAME	Terracette	TERR
Kettle	KETT	Trough floor	TRFL
Landslide	LAND	Trough wall	TRWA
Moraine	MORA	Upland	UPLA
Mountain slope	MOSL		

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FIREMON Appendix

Appendix D: Rick Miller Method for Sampling Shrub Dominated Systems.

Derived from Miller, R.F., T.J. Svejcar, and J.A. Rose. 2000. Impacts of western juniper on plant community composition and structure. *J. Range Manage.* 53:574-585.

Macroplot: 40 X 60 meters (figure AP-1)

Plot Layout

1. Permanent macro plot is staked in each corner and the lower left corner GPS'ed.
2. 3, 60-meter transects are located at the 0, 20, and 40 meter points along the 40 meter line.

Tree Measurements

1. Juniper tree counts are recorded along each 60-meter line in a 6 x 60 meter belt (a tape or 3 meter pole is used to measure the width along the belt).
2. Trees are recorded in the following classes: Old Growth, Dominant (75 percent to maximum height), Subcanopy (3 meters to 75percent of maximum canopy height), Sapling (1 to 3 meters), Juveniles (30 cm to 1 meter). Trees < 30 cm are measured in the 2 x 60 meter shrub plot. All old growth trees (separated from younger trees by differences in bark and canopy morphology) occurring with the 40 x 60 meter macro plot are recorded. (Note if there are less than 20 trees >1 meter in height in the macro plot we count all trees within the macro plot).
3. Tree canopy cover is measured along each 60-meter line using the line intercept technique (we use the 3 meter PVC pole to mark the canopy edge where it intercepts the line).
4. If trees are to be aged, cores are collected at 30 cm height for trees >6 to 10 cm in diameter. Trees <6 cm diameter are cut at ground level and a disk collected. The disk is always labeled on the top.
5. Parameters measured for cored trees are:
 - a. basal diameter
 - b. tree height (estimated using the 3 meter pole)

Shrub Measurements

1. Shrub density is measured along each 60-meter line in a 2 x 60 meter belt (a tape or 1 meter pole is used to measure the width along the belt).
2. Shrub cover is measured along each 60-meter line using the line intercept. Live and dead cover are recorded separately using the 15 cm rule (canopy gaps >15 cm within a single shrub canopy or dead foliage >15 cm within a live canopy are reported as such).

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FIREMON Appendix

Herbaceous and ground Measurements

Depending on the study we may or may not measure herbaceous cover by species. However, we always do nested frequency and cover by functional groups.

Functional Groups:

1. Deep rooted perennial grasses (PG)
2. Shallow rooted perennial grasses (e.g. *Poa sandbergii*)
3. Annual grasses
4. Perennial forbs
5. Annual forbs
6. Bare ground
7. Rock
8. Biological crusts and mosses

Nested frequency is measured in 0.02, 0.2, and 0.4 m² plots every 3 meter along each 60 meter line (n = 60 plots/macro plot)

Herbaceous cover is estimated in 20, 0.2 m² plots spaced every 3 meter along each 60 meter line.

Functional group cover is estimated in 20, 0.2 m² plots spaced every 3 meter along each 60 meter line.

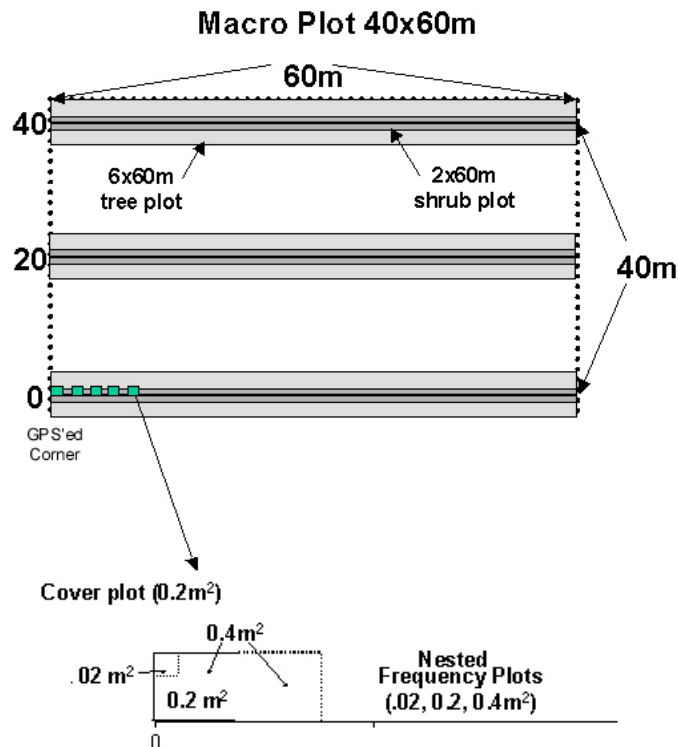


Figure AP-1. Rick Miller plot design for sampling in shrub dominated systems.