Abstract:
There has been a long history of geomorphic, hydrological, and ecological study in the experimental watersheds of HJA, which include WS1 and WS3 and the neighboring old-growth basin, WS2. These include comparative studies of sediment yield, stream chemistry, and water flow following whole-basin logging of WS1 and patch-cut logging of WS3, and long-term studies of post-harvest forest development. The latter, initiated in 1962, are among the longest-running and most intensive studies of secondary succession in forests of North America. They are based on two types of permanent plots (understory and overstory), spatially linked to facilitate analyses of overstory-understory interactions. Plots in WS1 and WS3 occur within transects within units of the watersheds. Understory quadrats were established in 1962, prior to harvest, and have been sampled periodically since the watersheds were cut and broadcast burned. They have been used to study how species’ life histories, pre-disturbance composition, disturbance intensity, and overstory development contribute to the long-term dynamics of the understory. These are 2 m by 2 m quadrats where canopy cover, ground conditions, growth forms, species cover and biomass have been monitored. Overstory tree plots were established nearly two decades later (1979-1980) to characterize the early stages of forest development, including the recruitment (ingrowth), growth, and mortality of conifers and hardwoods. These are circular plots (radius=8.92 m) where live trees greater than or equal to 1.37 m tall are measured for diameter at breast height or basal diameter. Remeasurement of these plots occurs on 5 or 6 year intervals.

Keywords: Biomass (trees); Biomass (understory); Canopy closure; Canopy communities; Clearcut logging; Community composition; Community structure; Disturbance; Long-Term Ecological Research (LTER); Nutrients; Plant community ecology; Plant succession; Primary production; Slash burning; Slash/broadcast burning; Succession; Trophic structure; Organic matter; Primary production; Communities; Community structure; Long-Term Ecological Research (LTER); Plant ecology; Canopy cover; Biomass; Community composition; Trophic structure; Succession; Primary production; Disturbance; Burning; Timber harvest; Clearcutting; Nutrients; Organic matter; Canopies; Plants; Trees; Understory vegetation;

Date data commenced: 1962-01-01
Date data terminated: 2017-10-27
Principal Investigator: Charles B. Halpern

List of Entities:
1. Watersheds 1 and 3 Succession Plots -- Plot descriptions: Vegetation and soil classifications with location, elevation, aspect and slope measurements
2. WS1 & 3 Succession Plots -- Cover, frequency, and biomass measurement data
3. WS1 & 3 Succession Plots -- Tagged trees: Diameter data
4. WS1 & 3 Succession Plots -- Tagged trees: Height data
5. WS1 & 3 Succession Plots -- Canopy closure
6. Reference trees for plot center re-location

Attribute List:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Description</th>
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2. WS1 & 3 Succession Plots -- Cover, frequency, and biomass measurement data

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UNIT N N char(2) enum 1.0000 3.0000
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PLOT N N numeric(2,0) range 1.0000 27.0000 number
QUADRAT Y N char(1) enum
SPECIES Y N char(6) taxa
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COVER N Y numeric(5,1) range 0.0000 100.0000 %
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DBA N Y numeric(5,1) range 0.1000 120.0000 cm
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4. WS1 & 3 Succession Plots -- Tagged trees: Height data

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TRANSECT N N char(1) enum 1.0000 6.0000
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QUARTER Y Y numeric(1,0) range 1.0000 4.0000 number
TAG Y Y numeric(5,0) range 4.0000 3110.0000 number
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HDIA N Y numeric(5,1) range 1.4000 17.5000 cm
TREE_HT N N numeric(5,1) range 1.2000 10.2000 m
LEADER N Y numeric(3,0) range 15.0000 110.0000 cm
SAMPLEDATE N Y datetime range 6/21/1979 9/11/1979
COMMENTS N Y varchar(200) freetext

5. WS1 & 3 Succession Plots -- Canopy closure

Attribute List:
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UNIT N N char(2) enum 1.0000 3.0000
TRANSECT N N char(1) enum 1.0000 6.0000
PLOT N N numeric(2,0) range 1.0000 27.0000 number
COVNW N Y numeric(5,1) range 0.0000 100.0000 %
COVNE N Y numeric(5,1) range 0.0000 100.0000 %
COVSE N Y numeric(5,1) range 0.0000 100.0000 %
COVSW N Y numeric(5,1) range 0.0000 100.0000 %
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CCONIF N N numeric(5,1) range 0.0000 100.0000 %
CHRDWOOD N N numeric(5,1) range 0.0000 100.0000 %
CShrub N N numeric(5,1) range 0.0000 100.0000 %
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**Reference trees for plot center re-location**

**Attribute List:**

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<td>Enum</td>
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**Attributes Definitions:**

**ASPECT**

General aspect of plot by 8 cardinal directions

**ASPECT_DEM10**

Aspect determined from 10 meter DEM at GPS plot coordinates

**ASPECT_FIELD**

Aspect as measured by true north-based azimuth (deg), measured in 2002

**BDIA**
Basal diameter
CANCLOS
Relative canopy closure
CCONIF
% canopy cover by conifers (> 2 m tall)
CHRDWOOD
% canopy cover by hardwoods (> 2 m tall)
CLPCLASS
Clump size class
CLUMP
Clump number
COMMENTS
Comments
COVER
Cover (percent of plot) - this is either plant species, growth form or ground surface cover
COVNE
Percent cover in ne quadrant
COVNW
Percent cover in nw quadrant
COVSE
Percent cover in se quadrant
COVSW
Percent cover in sw quadrant
CSHRUB
% canopy cover by shrubs (> 2 m tall)
CTOTAL
Total canopy cover (> 2 m tall)
DBA
Basal diameter - measured at base above any basal swell
DBH
Diameter at breast height - measured directly above the nail
DIRECTN
Direction relative to start of transect (as you look toward plot 1 on transect
ELEVATION_DEM10
Elevation (m) determined from 10 meter DEM at GPS plot coordinates
ELEVATION_GPS
Elevation as measured by a Trimble Asset Surveyor with TDC-1 data logger in the field or interpolated (See gps_type)
ELEVATION_LIDAR
   Elevation as determined from 1 meter LIDAR at GPS plot coordinates in NAD83

FORMAT
   Entity number

FREQUENCY
   Frequency of a single species occurrence (0 to 9) in nine 1.1 foot-square plots in one quarter of 6.6 square foot central plot - used from 1962 through 1977

GPS_TYPE
   Defines method of assigning location coordinates: measured in field with Trimble Asset Surveyor (M) or interpolated from measured plots (I)

HDIA
   Diameter at breast height

HEIGHT
   Plant height

INDIV_COUNT
   Unique consecutive number assigned to each species requiring biomass measurements to account for multiple occurrences within the plot, e.g., multiple stems (formerly lc=line count)

LATITUDE
   Degrees latitude as determined from the GPS plot coordinates using NAD83 datum

LEADER
   Length of the current leader

LENGTH
   Length

LOCATION
   Indicates where the truck mirror was placed in the plot

LONGITUDE
   Degrees longitude as determined from the GPS plot coordinates using NAD83 datum

NEARTAG
   Tag near the tree of interest

OLDTAG
   Previous tag different from the tag of current measurement year

OUTOFPLOT
   Indicates whether plant species is rooted outside of plot (Y=outside, N=inside) - use begins in 2002

PLANT_COMMUN
   Plant community code (Rothacher, Jack; Dyrness, C. T.; Fredriksen, Richard L. 1967.)

PLOT
   Plot number of 250 square meter plot

PLOTID
   Plot Id consisting of watershed, unit, transect, and plot number
QUADRAT
Quadrat number - the central, original and long-term cover measurement plot is quadrat 0 - satellite quadrats (1-4) were added to increase the sampling area within the 250 sq. m plot but were discontinued (WS01: 1980-1983, WS03: 1979-1987)

QUARTER
Quarter number in plot

REF1_AZ
Azimuth from reference tree 1 to plot center location

REF1_DIST
Distance from reference tree 1 to plot center location

REF1_TAG
Tag number for reference tree 1

REF2_AZ
Azimuth from reference tree 2 to plot center location

REF2_DIST
Distance from reference tree 2 to plot center location

REF2_TAG
Tag number for reference tree 2

SAMPLEDATE
Field measurement date

SLOPE_DEM10
Slope determined from 10 meter DEM at GPS plot coordinates

SLOPE_FIELD
Slope of plot as estimated in the field from plot center

SOIL_DISTURB
Soil disturbance code

SOIL_TYPE
Soil type code (Rothacher, Jack; Dyrness, C. T.; Fredriksen, Richard L. 1967. and Dyrness, C. T. 1969.)

SPECIES
Species code

SPECIES1
Species 1 code

SPECIES2
Species 2 code

SPECIES3
Species 3 code

SPECIES4
Species 4 code

SPECIES5
Species 5 code

STATUS
The status of the tree

STCODE
Study code

STEMCOUNT
Count of stems within the clpclass 0 or 3

STEMS
Number of stems

TAG
Stem tag number - use begins in 1983 and all trees are tagged greater than 1.37 meters tall

TRANSECT
Transect number

TREE_HT
Height of the tree

TREE_SPP
Tree species code

TYPE
Cover type indicator - describes whether SPECIES is a plant species, genus or family, a growth form, or a ground surface type

UNIT
Watershed / Cutting unit number

UTM_EASTING
UTM Easting coordinate - Zone 10

UTM_NORTHING
UTM Northing coordinate - Zone 10

VIGOR
Vigor of the tree

WATERSHED
Watershed number

WIDTH
Width

YEAR
Year of measurement

Enumerated Domains:

Enumerated Domain for Attribute: ASPECT
  NE  Northeast
  SW  Southwest
NW  Northwest
S   South
W   West
E   East
N   North
SE  Southeast
Unknown aspect
PS  Plant species
PF  Plant family
PG  Plant genus

Enumerated Domain for Attribute: PLANT_COMMUN
7  Unclassified
1  Corylus cornuta - Gaultheria shallon
4  Acer circinatum - Berberis nervosa
2  Rhododendron macrophyllum - Gaultheria shallon
3  Acer circinatum - Gaultheria shallon
6  Polystichum munitum
5  Coptis laciniata

Enumerated Domain for Attribute: SOIL_DISTURB
1  Undisturbed
2  Disturbed/unburned
4  Severely (heavily) burned
3  Lightly burned

Enumerated Domain for Attribute: SOIL_TYPE
8  Stony limberlost
9  Talus
3  Andesite colluvium
1  Frissell
7  Stony frissell
2  Limberlost
4  McKenzie River
5  Budworm
6  Slipout

Enumerated Domain for Attribute: TRANSECT
5 Transect 5 - 5th lowest elevation transect for locating plots across watershed/unit
4 Transect 4 - 4th lowest elevation transect for locating plots across watershed/unit
2 Transect 2 - 2nd lowest elevation transect for locating plots across watershed/unit
3 Transect 3 - 3rd lowest elevation transect for locating plots across watershed/unit
1 Transect 1 - lowest elevation transect for locating plots across watershed/unit
6 Transect 6 - highest elevation transect for locating plots across watershed/unit

Enumerated Domain for Attribute: UNIT
32 WS03 - Unit 2: USFS stand number 1000887, cutting unit L221, original unit 9D
33 WS03 - Unit 3: USFS stand number 1000941, cutting unit L222, original unit 9E
31 WS03 - Unit 1: USFS stand number 1000872, cutting unit L141, original unit 9C
11 WS01 - Unit 1: USFS stand number 1001009, cutting unit Watershed 1, original unit number not assigned

Enumerated Domain for Attribute: STCODE
TP073 Study Code TP073

Enumerated Domain for Attribute: GPS_TYPE
M Measured
I Interpolated

Enumerated Domain for Attribute: OUTOFPLOT
9 Outside of plot status not recorded
Y Plant rooted outside of measurement quadrat
N Plant rooted inside of measurement quadrat

Enumerated Domain for Attribute: TRANSECT
5 Transect 5 - 5th lowest elevation transect for locating plots across watershed/unit
4 Transect 4 - 4th lowest elevation transect for locating plots across watershed/unit
2 Transect 2 - 2nd lowest elevation transect for locating plots across watershed/unit
3 Transect 3 - 3rd lowest elevation transect for locating plots across watershed/unit
1 Transect 1 - lowest elevation transect for locating plots across watershed/unit
6 Transect 6 - highest elevation transect for locating plots across watershed/unit

Enumerated Domain for Attribute: UNIT
32 WS03 - Unit 2: USFS stand number 1000887, cutting unit L221, original unit 9D
33 WS03 - Unit 3: USFS stand number 1000941, cutting unit L222, original unit 9E
31 WS03 - Unit 1: USFS stand number 1000872, cutting unit L141, original unit 9C
11 WS01 - Unit 1: USFS stand number 1001009, cutting unit Watershed 1, original unit number not assigned

Enumerated Domain for Attribute: STCODE
TP073 Study Code TP073
Enumerated Domain for Attribute: QUADRAT
0 Central and long-term measurement plot (quadrat) for percent cover
1 Satellite quadrat 1 established in one corner of each plot
2 Satellite quadrat 2 established in one corner of each plot
3 Satellite quadrat 3 established in one corner of each plot
4 Satellite quadrat 4 established in one corner of each plot

Enumerated Domain for Attribute: TYPE
PC Plant cover
GF Growth form
GC Ground cover

Enumerated Domain for Attribute: CLPCLASS
B Measurements were taken at the base of the tree
0 Dbh = 0 to 2.9 cm.
3 Dbh = 3.0 to 4.9 cm.
H Measurements were taken at breast of height (1.37 meters above base)
M Place holder for where tags are missing; these need to be replaced

Enumerated Domain for Attribute: STATUS
7 All stem(s) have grown out of this size class
9 Missing
2 Ingrowth
6 Dead
1 Alive, present last time
0 Establishment year

Enumerated Domain for Attribute: TRANSECT
5 Transect 5 - 5th lowest elevation transect for locating plots across watershed/unit
4 Transect 4 - 4th lowest elevation transect for locating plots across watershed/unit
2 Transect 2 - 2nd lowest elevation transect for locating plots across watershed/unit
3 Transect 3 - 3rd lowest elevation transect for locating plots across watershed/unit
1 Transect 1 - lowest elevation transect for locating plots across watershed/unit
6 Transect 6 - highest elevation transect for locating plots across watershed/unit

Enumerated Domain for Attribute: UNIT
32 WS03 - Unit 2: USFS stand number 1000887, cutting unit L221, original unit 9D
33 WS03 - Unit 3: USFS stand number 1000941, cutting unit L222, original unit 9E
31 WS03 - Unit 1: USFS stand number 1000872, cutting unit L141, original unit 9C
11 WS01 - Unit 1: USFS stand number 1001009, cutting unit Watershed 1, original
Enumerated Domain for Attribute: VIGOR
3 Very bad
1 Alive, present last time
2 Poor
M Vigor is not recorded for dead or missing trees
U Unknown vigor of a living tree - vigor is not recorded
N Vigor is not recorded for clumps (clpclass=0 or 3)

Enumerated Domain for Attribute: STCODE
TP073 Study Code TP073

Enumerated Domain for Attribute: TRANSECT
5 Transect 5 - 5th lowest elevation transect for locating plots across watershed/unit
4 Transect 4 - 4th lowest elevation transect for locating plots across watershed/unit
2 Transect 2 - 2nd lowest elevation transect for locating plots across watershed/unit
3 Transect 3 - 3rd lowest elevation transect for locating plots across watershed/unit
1 Transect 1 - lowest elevation transect for locating plots across watershed/unit
6 Transect 6 - highest elevation transect for locating plots across watershed/unit

Enumerated Domain for Attribute: UNIT
32 WS03 - Unit 2: USFS stand number 1000887, cutting unit L221, original unit 9D
33 WS03 - Unit 3: USFS stand number 1000941, cutting unit L222, original unit 9E
31 WS03 - Unit 1: USFS stand number 1000872, cutting unit L141, original unit 9C
11 WS01 - Unit 1: USFS stand number 1001009, cutting unit Watershed 1, original unit number not assigned

Enumerated Domain for Attribute: STCODE
TP073 Study Code TP073

Enumerated Domain for Attribute: CANCLOS
3 51 - 75% canopy closure
4 76 - 100% canopy closure
2 26 - 50% canopy closure
1 0 - 25% canopy closure
N Not measured

Enumerated Domain for Attribute: DIRECTN
L Left of transect (as you look up transect)
D Down transect (toward the last plot on transect)
R Right of transect (as you look up transect)
U Up transect (toward plot 1 on transect)
Not measured

Enumerated Domain for Attribute: **LOCATION**
- NE: Mirror in northeast corner
- NW: Mirror in northwest corner
- SE: Mirror in southeast corner
- R: Mirror at rebar
- SW: Mirror in southwest corner

9 Not measured

Enumerated Domain for Attribute: **TRANSECT**
- 5: Transect 5 - 5th lowest elevation transect for locating plots across watershed/unit
- 4: Transect 4 - 4th lowest elevation transect for locating plots across watershed/unit
- 2: Transect 2 - 2nd lowest elevation transect for locating plots across watershed/unit
- 3: Transect 3 - 3rd lowest elevation transect for locating plots across watershed/unit
- 1: Transect 1 - lowest elevation transect for locating plots across watershed/unit
- 6: Transect 6 - highest elevation transect for locating plots across watershed/unit

Enumerated Domain for Attribute: **UNIT**
- 32: WS03 - Unit 2: USFS stand number 1000887, cutting unit L221, original unit 9D
- 33: WS03 - Unit 3: USFS stand number 1000941, cutting unit L222, original unit 9E
- 31: WS03 - Unit 1: USFS stand number 1000872, cutting unit L141, original unit 9C
- 11: WS01 - Unit 1: USFS stand number 1001009, cutting unit Watershed 1, original unit number not assigned

Enumerated Domain for Attribute: **STCODE**
- TP073: Study Code TP073

Enumerated Domain for Attribute: **TRANSECT**
- 5: Transect 5 - 5th lowest elevation transect for locating plots across watershed/unit
- 4: Transect 4 - 4th lowest elevation transect for locating plots across watershed/unit
- 2: Transect 2 - 2nd lowest elevation transect for locating plots across watershed/unit
- 3: Transect 3 - 3rd lowest elevation transect for locating plots across watershed/unit
- 1: Transect 1 - lowest elevation transect for locating plots across watershed/unit
- 6: Transect 6 - highest elevation transect for locating plots across watershed/unit

Enumerated Domain for Attribute: **UNIT**
- 32: WS03 - Unit 2: USFS stand number 1000887, cutting unit L221, original unit 9D
- 33: WS03 - Unit 3: USFS stand number 1000941, cutting unit L222, original unit 9E
- 31: WS03 - Unit 1: USFS stand number 1000872, cutting unit L141, original unit 9C
- 11: WS01 - Unit 1: USFS stand number 1001009, cutting unit Watershed 1, original unit number not assigned
Enumerated Domain for Attribute: STCODE
TP073  Study Code TP073