

Reforestation Practices for Conifers in California

Presentation to the BOF on July 15, 2020
by William Stewart, Technical Editor, UCANR and Tom Jopson,
FVMC Forest Legacy Committee Chair
on the update of the 1971 classic with 500+ pages and 800+
references

**16 year old plantation Modoc Co.: both areas planted after wildfire
No weed control (L) vs. weed control (R)**



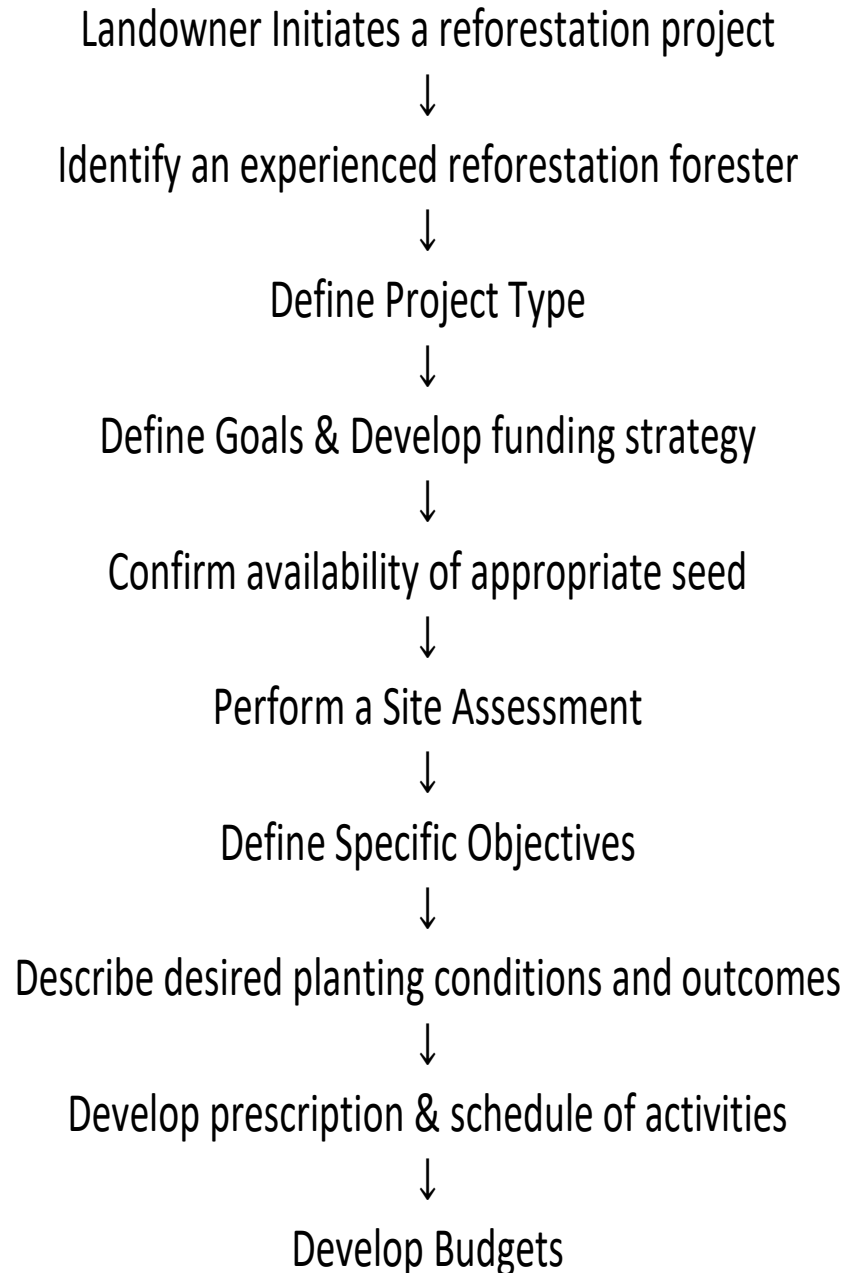
Forty years of research and testing, 5 simply stated principles:

Five Principles of Reforestation

1. Use tree species from known appropriate seed sources which can be established and grow vigorously on the site without irrigation;
2. Control vegetation that would otherwise compete with planted seedlings for limited soil moisture during the critical first and possibly the second year after planting;
3. Use seedlings that are able to withstand the conditions on the site when planted and are able to rapidly grow new roots after planting;
4. Properly handle, transport, store and plant seedlings and plant them properly when conditions on the site allow for rapid root growth;
5. Protect seedlings from damage by animal and insect pests, if necessary.

Simple principles, complex implementation:

FIGURE 3.1 – REFORESTATION FLOW CHART



← **Reforestation Project Types** →



Restoration/rehabilitation



Forest Management/ Restoration plan



Timber harvest/green sale



Timber Harvest Plan



Post-wildfire



Exemption/Emergency Notice

Identify Necessary Permits



Obtain appropriate seed



Order seedlings and identify cooler storage



Contract for and conduct pre-harvest veg management spray



Coordinate with Harvest operations



Find Site Prep Contractors



Vegetation Management: Mechanical/Manual/Burning/Chemical



Request Timing of Seedling Packing and Delivery



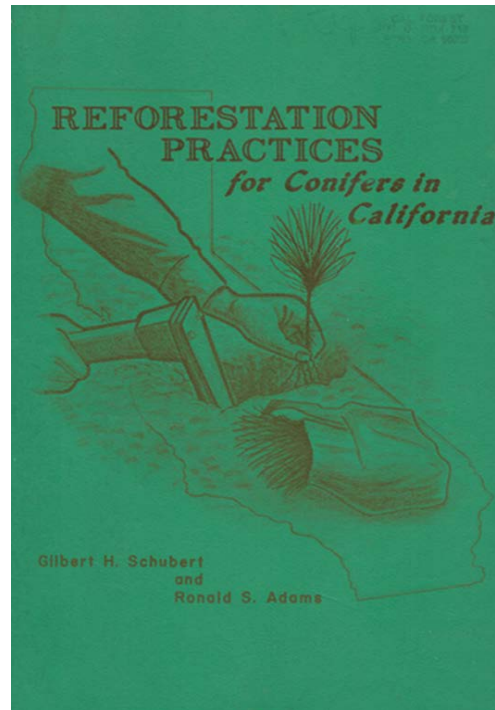
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Ch. 1 Reforesting California

Herb Baldwin, William Stewart, Sari Sommarstrom

- Early History
- Current Needs:
 - Why?
 - Where?
 - Who?
 - When?
 - What?

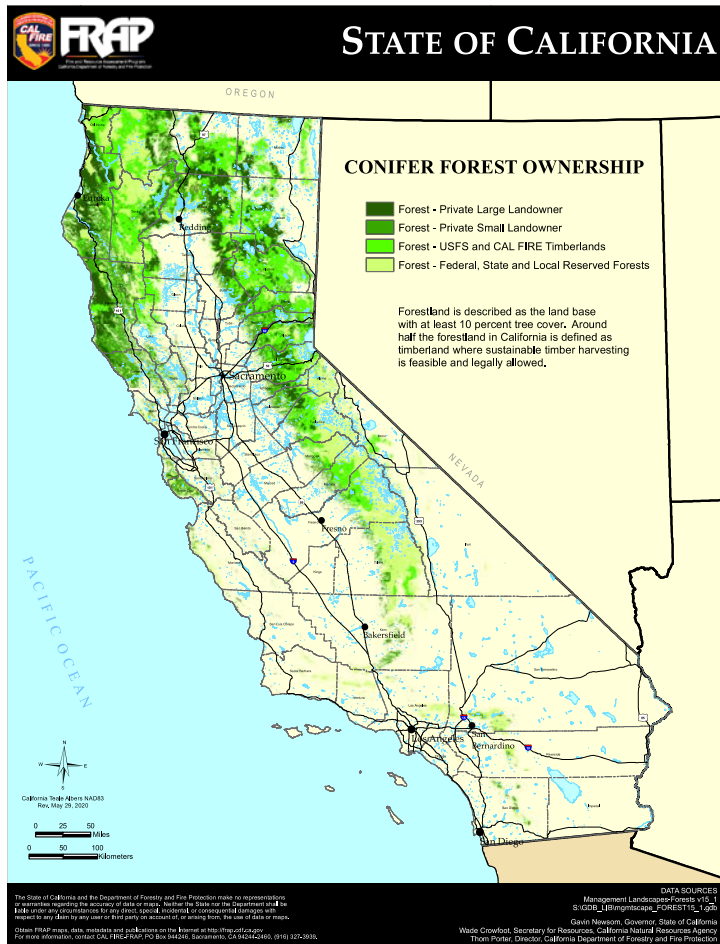


State of California (1971)



Ch. 1 Reforesting California

Herb Baldwin, William Stewart, Sari Sommarstrom

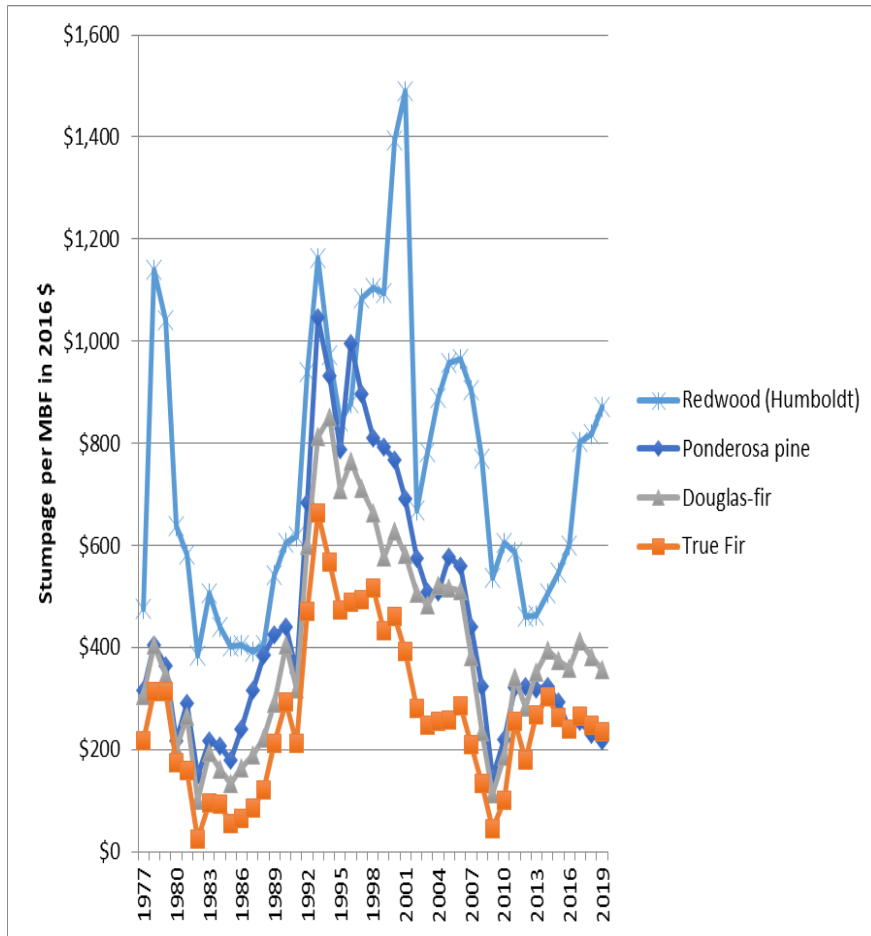


Forest type	USFS	Corp	Family	O Govt	Total
CA mixed conifer	4.2	1.6	0.5	0.1	6.5
Ponderosa pine	1.2	0.4	0.4	0.0	2.1
Douglas-fir	0.2	0.3	0.3	0.0	0.9
Red fir, etc	1.1	0.2	0.1	0.0	1.4
Redwood	0.0	0.4	0.2	0.0	0.7
Other	2.3	1.3	1.5	0.2	5.1
Total CA Timberlands	8.9	4.3	3.0	0.4	16.6

Different managers, different species, different goals

Ch. 2 – Investing in Reforestation

William Stewart, Rick Standiford, Susie Kocher, Jeff Webster

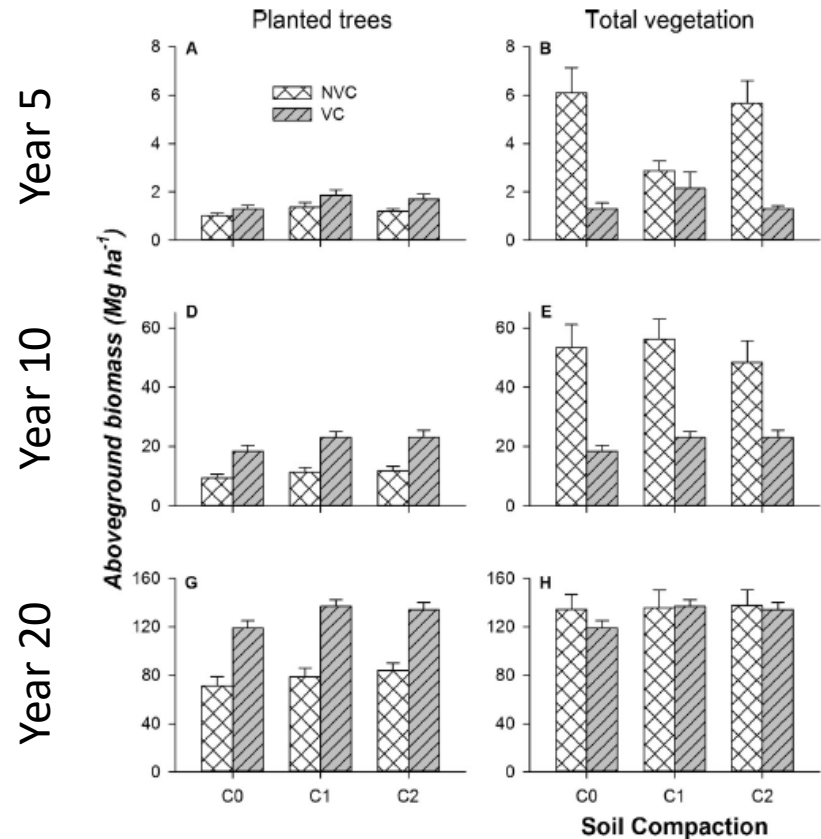


- Why invest? For healthy forests and future harvest value
- Financial options
- Cost-share programs
- Estimating costs & revenues
- Basic Analysis Tools

Ch. 2 – Investing in Reforestation

William Stewart, Rick Standiford, Susie Kocher, Jeff Webster

- California is perfect for growing shrubs
- Once established, well-spaced conifers can sequester ~2x carbon as shrub/tree sites
- As the IPCC noted again in 2019, sustainable forestry generates substantial climate benefits in the forest and through low-emission products



Zhang J, Busse MD, Young DH, Fiddler GO, Sherlock JW, TenPas JD. 2017. Aboveground biomass responses to organic matter removal, soil compaction, and competing vegetation control on 20-year mixed conifer plantations in California. *Forest Ecology and Management* 401:341-353.

Ch. 3 -Planning a Reforestation Project

Jeff Webster, Ed Fredrickson, Bob Ryneearson

Reforestation Flow Chart

- ❖ Each step is essential to success.
- ❖ Failure at one step can result in reduced success or failure of the whole project.

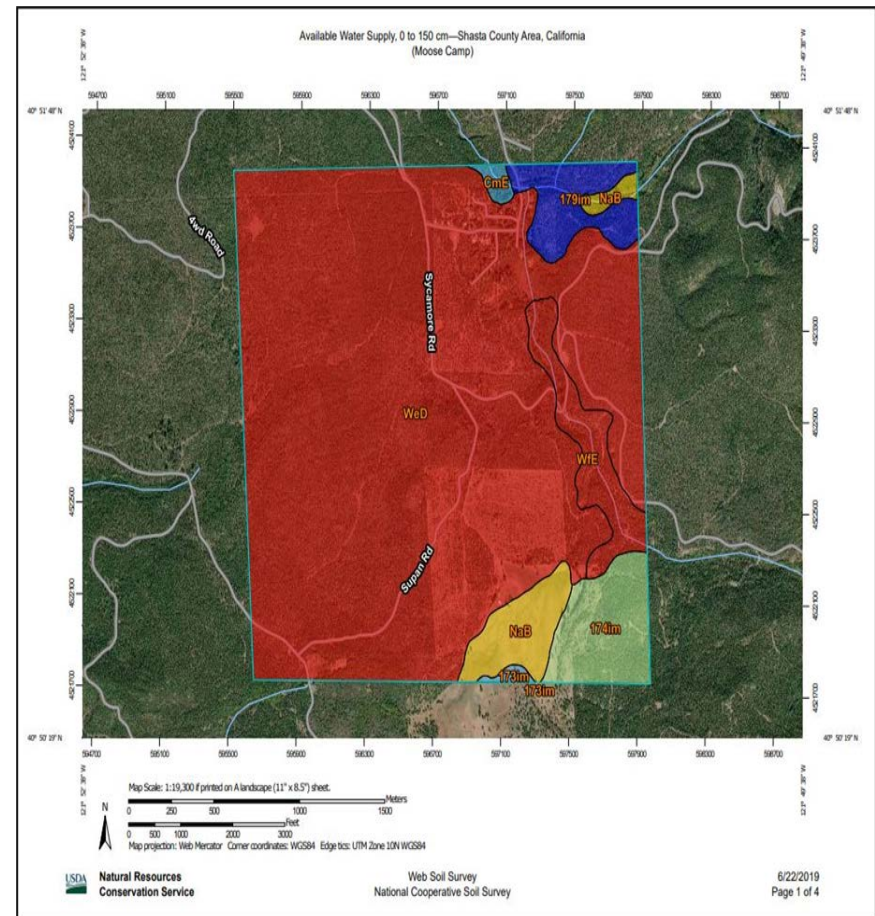
Schedules of Activities:

- Post-Harvest
- Post-Wildfire
- Rehabilitation: Brush field conversion

Ch. 4 – Site Assessment

Jeff Webster, Ed Fredrickson, Bob Rynearson

- Making & Using Maps
- Pre-Field Site Assessment
- On-Site Assessment
- Templates & Example



Ch. 5 – Seed for Reforestation

Teri Griffis and Laurie Lippitt

- Seed Origin
- Biology
- Cone Collection
- Seed Banking
- Cone & Seed Processing
- Seed Lot Assessment
- Long-term Storage
- Tree Improvement



**CAL
FIRE**
COLLECTION TAG

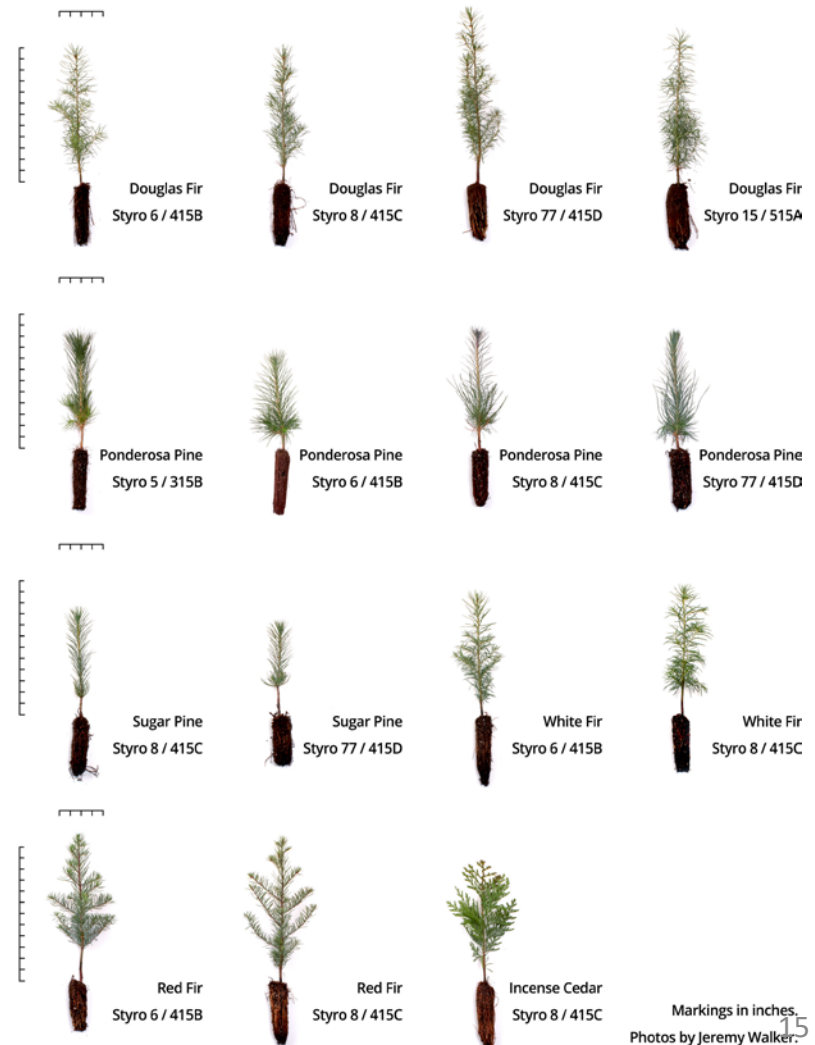
Company		
Species		
Lot Number		
Seed zone	Elevation	
T _____	R _____	Sec. _____
Date		

Use waterproof ink
Two tags per sack: one inside, one outside

Ch. 6 – Seedlings

Tom Jopson and Mark Gray

1. Choosing Species
2. Choosing Stock Type
3. Choosing a Nursery
4. Seedling Storage, Shipping & Handling



Ch. 7 – Site Preparation

Mark Gray and Jeff Webster

Critical step for seedling survival and growth



- Needs and Constraints
- Types:
 - Mechanical
 - Manual
 - Biological
 - Burning
 - Cultural
 - Chemical

Ch. 8 – Forest Vegetation Mgt.

Ed Fredrickson

- Competing Vegetation
- Methods of Veg Control
- Choosing a Method
- Non-Chemical Control
- Types of Herbicides
- Herbicide Behavior
- Resource Protection
- Pre-planting (site prep) vs. Post-planting (release)
- Project level considerations
- Site-Specific Issues
- Application Methods

Ch. 9 – Planting

Bob Rynearson

- Planting Season
- Species, Stock, Spacing
- Transport, Handling, Storage
- Planting Methods
- Contracting
- Organizational Needs
- Inspection
- Installing Protection
- Follow-up Surveys



Ch. 10 – Precommercial Thinning

Martin Ritchie and John-Pascal Berrill

- PCT Outcomes
- Thinning Decision Space
- Density Management
- Regional Considerations

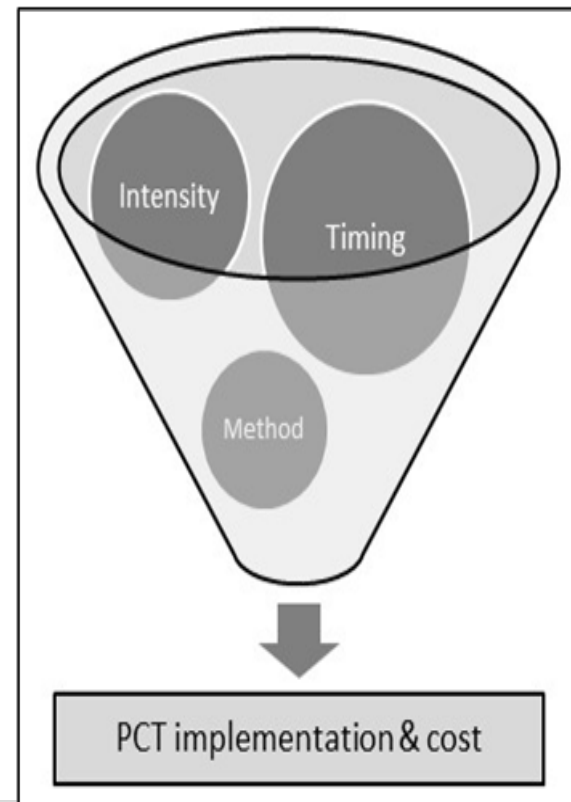


Diagram: PCT timing, intensity, and method affect how it can be implemented and the cost.

Ch. 11 – Damage

Donald Owen and Greg Giusti

- Assessing /Preventing / Mitigating Damage
- Insect Pests
- Diseases
- Vertebrate Pests
- Abiotic Damage



Ch. 12 – Reforestation of Areas Burned by Large Wildfires – Mark Gray

- Planning
- Unitizing
- Seed
- Mechanical Site Prep
- Veg Management
- Seedling Delivery
- Managing Sediment



Packing trees into the Moon Fire

How can the Board of Forestry help ensure successful reforestation?

- ❖ Seed Bank: Adequate seed for small private landowners
- ❖ Cost-share: Support implementation of all steps & promote relevant expertise
- ❖ Regulatory Structure: Provides timely approvals for necessary steps