

Considerations for Location of Ponds

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- Uses

Are the locations suitable for the intended use?

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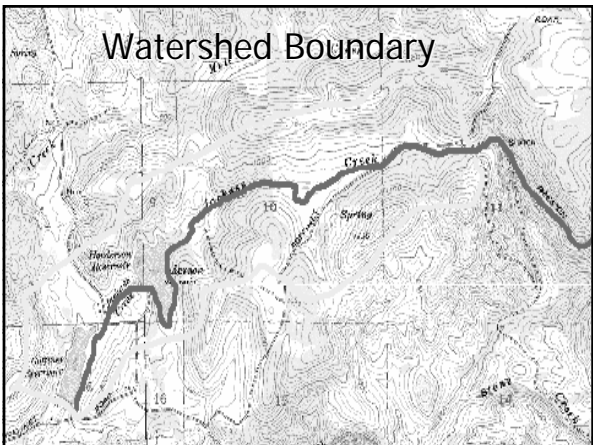
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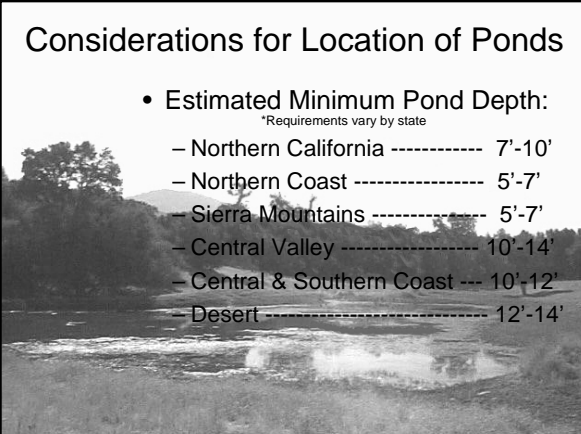
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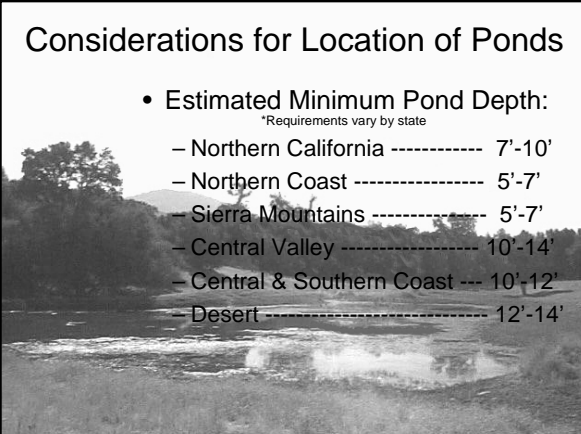
- Geology
 - Depth to impervious layer.
 - Ability of foundation to withstand load of the fill in the dam.
 - Potential for seepage through foundation and abutments.

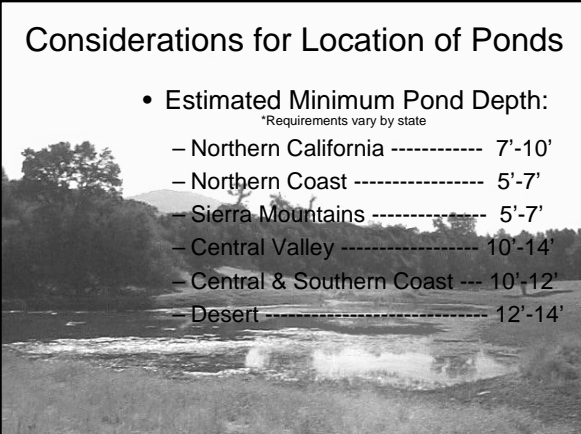
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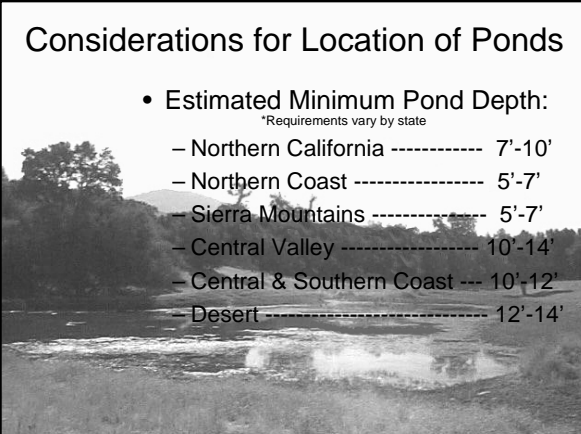
- Estimated Minimum Pond Depth:
 - *Requirements vary by state
 - Northern California ----- 7'-10'
 - Northern Coast ----- 5'-7'
 - Sierra Mountains ----- 5'-7'
 - Central Valley ----- 10'-14'
 - Central & Southern Coast --- 10'-12'
 - Desert ----- 12'-14'

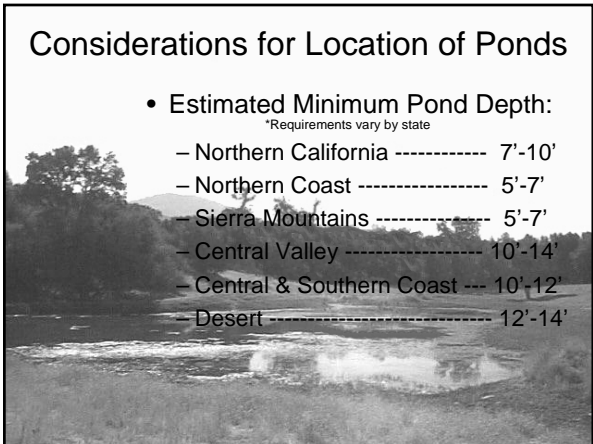
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Considerations for Location of Ponds

■ Water Rights

Are water rights available?

Is the water in the watershed fully allocated?

Information on water rights can be found at:
www.waterrights.ca.gov

Considerations for Location of Ponds

■ Emergency and recreational vehicle access.

■ If pond were to over-flow, consideration must be made to the surrounding area and downstream areas.

■ Dam failure hazard.

Commonly Used Terms

■ **Principle Spillway:** A pipe or vegetated outlet channel to carry **daily flows** safely past earth embankments. May also serve as an emergency spillway where space is limited.

■ **Emergency Spillway:** A rock, concrete, or vegetated outlet channel to carry **flood flows** safely past earth embankments.

Rock Riprap Face of Dam and Emergency Spillway



Commonly Used Terms

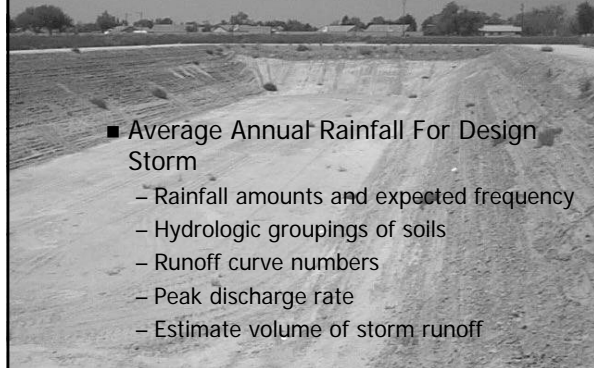
■ **Trickle tube:** A small pipe to allow water to pass through the dam, and protect the vegetation in the earth spillway against saturation.

■ **Drainpipe:** Allows drainage of pond without having to remove fill, use a siphon, pump or other devices.

■ **Water-Supply Pipe:** Used to fill orchard sprayers, stockwater troughs and to pump water for irrigation. Usually in addition to the trickle tube.



Design Considerations



- Average Annual Rainfall For Design Storm
 - Rainfall amounts and expected frequency
 - Hydrologic groupings of soils
 - Runoff curve numbers
 - Peak discharge rate
 - Estimate volume of storm runoff

Design Considerations

- Topography
 - Acquire enough survey data to plan the dam, spillway, and other features.
- Watershed Area
 - From USGS Quad Sheet.
- Watershed Slope
 - From USGS Quad Sheet.

Design Considerations

- Stability of Dam
 - Downstream channel stability
 - Stability of side slopes of the dam
 - Stability of spillway(s)
 - Proximity to active faults
- Composition of Dam
 - Optimum soil for dam should be a mixture of coarse and fine textured soils
 - Volume of soil available

Design Considerations



- Recommended 3:1 Slope on Upstream Side of Dam Recommended 2:1 Slope on Downstream Side of Dam
 - Slope should be flat enough to be stable, yet steep enough to minimize amount of fill required.
 - Slope will attenuate erosion by wave action from the pond.

Design Considerations

- The combined upstream and downstream side slopes of embankments shall not be less than 5 horizontal to 1 vertical.
- All slopes must be designed to be stable, even if flatter side slopes are required.

Design Considerations

- Type of Soil in Pond Area
 - Soil should have a high enough clay content to prevent seepage.
- Hazard Class of the Dam
 - Used to quantify hazard potential in the event of failure.
- Depth Required For Intended Uses

Design Considerations

- Emergency Spillway Location
 - Topography
 - Soil
 - Discharge Flow Rate
 - Velocity
 - Stable outlet

Design Considerations

■ Minimum Spillway Capacity

Table-4 from Page 7 of NRCS Conservation Practice #378: Ponds

Drainage Minimum Area ac	Effective Height of Dam ft	Storage ac-ft	Frequency yr	Duration hr
20 or less	20 or less	<50	10	24
20 or less	>20	<50	25	24
>20	20 or less	<50	25	24
All others			50	24

Design Considerations

- Criteria for State Size Dam
 - Over 25 feet high and 15 or more acre feet of storage.
 - Over 6 feet high and 50 or more acre feet of storage.

Other Considerations

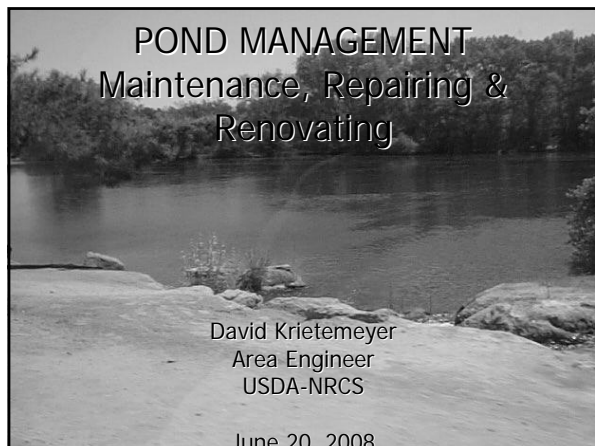
- County Ordinances
- Local Ordinances
- Permits
 - County Grading Permit
 - Fish and Game Permit
 - Regional Water Quality Control Board Clean Water Act
 - Water Rights
 - Army Corps of Engineers Clean Water Act

References

Pond Conservation Practice Standard #378
Section IV of USDA-NRCS
Field Office Technical Guide
Available at: www.ca.nrcs.usda.gov/fortg/

Ponds - Planning, Design, Construction
Agricultural Handbook #590 of USDA-NRCS
Available at: www.wcc.nrcs.usda.gov/water/quality/common/ponds.pdf

Questions



Maintenance, Repairing & Renovating

- Maintenance of Ponds
- Maintenance of Dams
- References
- Examples
- Questions

Maintaining the Pond

- Importance of Maintaining Vegetation
 - Erosion control
 - Climate control
 - Wildlife habitat

Maintaining the Pond

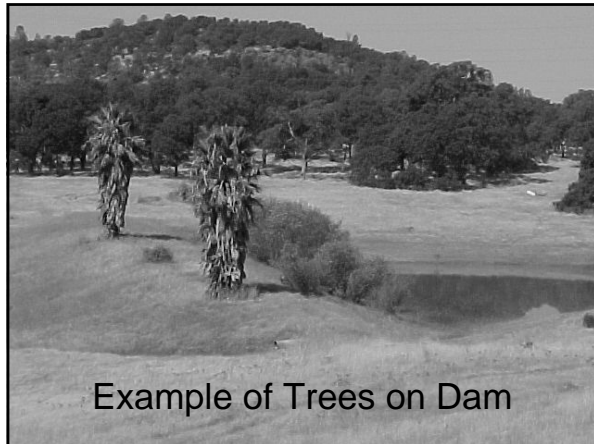
- Protecting Emergency Spillway Against Erosion
 - Apply seed or sod and fertilization for proper vegetation.
 - Use mulch on slopes that are difficult to vegetate.
 - Irrigate to insure proper germination and growth.

Maintaining the Dam

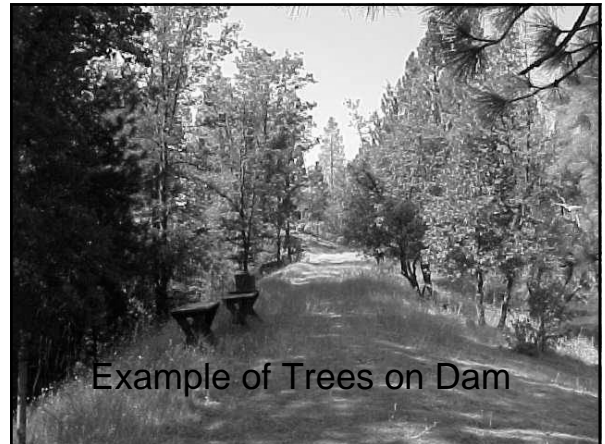
- Pipes Through the Dam
 - Trickle tube
 - Drainpipe
 - Water-Supply Pipes

Maintaining the Dam

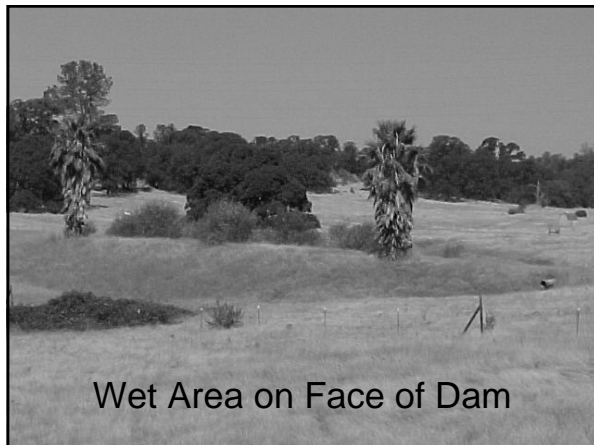
- Trees
 - Keep trees off and away from dam to prevent seepage through roots.
- Rodents
 - Rodents that burrow through the dam will create holes that allow seepage.



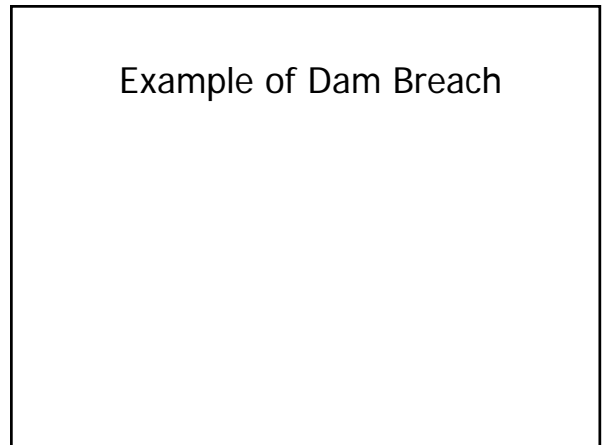
Example of Trees on Dam



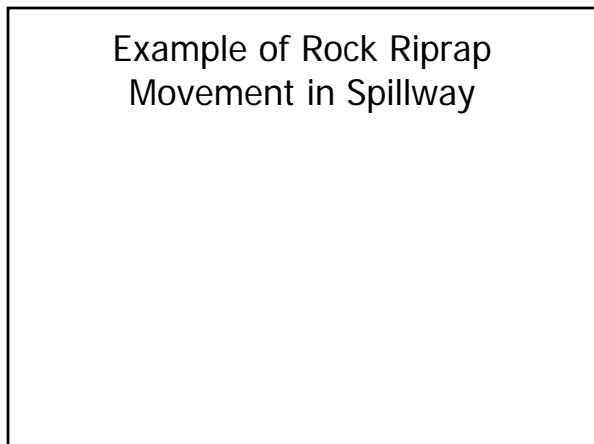
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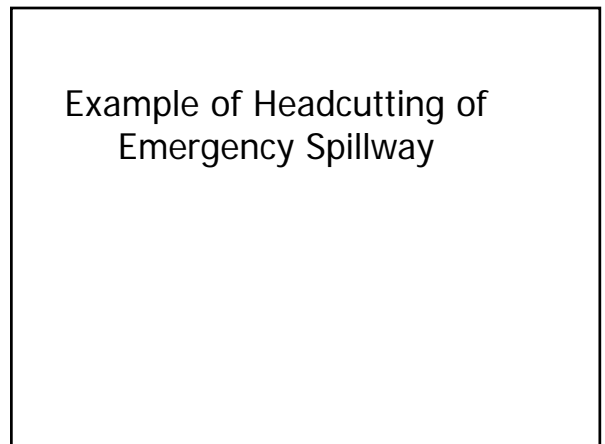
Wet Area on Face of Dam



Example of Dam Breach



Example of Rock Riprap
Movement in Spillway



Example of Headcutting of
Emergency Spillway

Example of Poor Riprap

Rodent Damage

- Depends on Extent of Damage
- Minor:
 - Fill with Bentonite, Fresh Concrete, or other similar material.
- Major:
 - Excavate area to at least 3" below damaged area at 1:1 or flatter slope and compact soil back into place.

