

ELWd Systems

div. of *Forest Concepts, LLC*



1911 SW Campus Dr., # 655 Federal Way, WA 98023-6441

Ph: 253-838-4759

Fax: 253-815-9900

web: www.elwdsystems.com

ELWd™ Engineered Large Woody Debris In-Stream Uses

Description

- Manufactured alternative to LWD
- All organic structure fabricated from small poles
- Readily available
- Delivered as kits or assembled
- Cost efficient
- Range of lengths and diameters
- Ballast with cobble or spawning gravel



Technical Features

- High structural integrity
- High hydraulic roughness
- High organic surface area
- High habitat complexity for juveniles

Applications

- Bank protection
- Complex cover/ root wad alternative
- Bioengineering alternative
- Gravel sorting
- Flow routing/ deflector logs
- Sediment storage in channel
- Digger logs

Advantages and Benefits

- Increased biotic activity from large surface area
- Increased hydraulic roughness from convoluted shape
- Additional juvenile fish habitat from complex shape and crevices
- Improved scour pool formation from ballasting that keeps toe in contact with stream bottom
- Reduces bank erosion when installed as a bank log
- Captures and holds organic debris
- Decay products blend with the environment and contribute to organic flux

Installation

- A skilled crew of three to four persons can install six to ten 12' to 16' ELWd™ structures per day depending on site conditions.
- A skilled crew of five to six persons can install five to eight 20'-24' ELWd™ structures per day depending on site conditions.
- Weight of individual poles (approximate)
 - o 16' poles = 150-200 lbs
 - o 20' poles = 180-220 lbs
 - o 24' poles = 250-300 lbs
- Anchor similar to traditional solid LWD

Design Criteria

- Structures can be made from six to twelve poles
 - o A six pole structure made from poles with 8 inch butt diameter will have the same overall diameter as an eight pole structure made from poles with 6 inch butt diameter.
 - o Higher pole count
 - Provides larger core diameter, enabling more ballast
 - Smaller poles for ease of handling
 - Smaller poles results in shorter useful life
 - o Lower Pole Count
 - Increases strength
 - Increases useful life
 - Increases need for anchoring

Site Limitations (similar to traditional LWD)

- Avoid structural applications where long life is critical
- Avoid rapidly down-cutting streams
- Avoid bedrock channels
- Best in low gradient streams (<3%)

Risk to Habitat

- Minimal impact on surrounding environment
- No large equipment or machinery needed

Risk to Structure

- High Flows and flood debris can damage structure
- Components lose strength over time from natural decay

Reliability Uncertainty and Monitoring

- Oldest installation to date is 3 years (currently being monitored by the University of Washington)
- Structures have performed as well as or better than traditional LWD for habitat functions

Construction Considerations

- Easily installed by volunteer and conservation crews
- Only hand tools are need to assemble and install all but the largest ELWd™ structures
- Structures can be filled with gravel and willow cuttings so the structure will knit into the bank over time.
- Hollow core of structure can be filled with cobble, limestone or spawning gravel for ballast.

Safety

- Do not stand on the down hill side of a pole or structure during assembly on slopes
- Avoid pinch points between poles during assembly and positioning
- Practice safe lifting techniques when moving individual poles
- Structures longer than 24 feet should be handled by machinery

Cost

The method of cost estimation for ELWd™ structures is based on the following criteria:

- Cost of materials
 - o Purchase Price
 - o Donation of poles and manufacturing labor
- Distance of delivery
 - o See ELWd Systems Assortment Packs for typical truckload quantities
- Order Quantity
- Related costs
 - o Ballast materials
 - o Anchoring devices and cable
- Labor requirements

Site Examples



An ELWd™ structure was installed for bank protection at the mouth of a tributary on Thornton Creek.



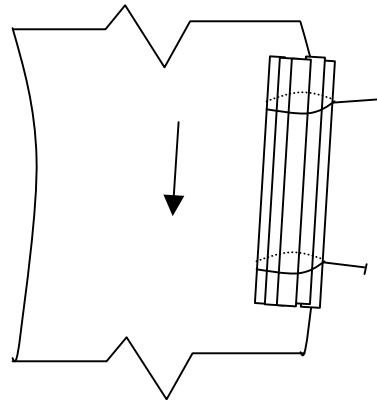
Two ELWd™ structures on a bend in Newaukum Creek



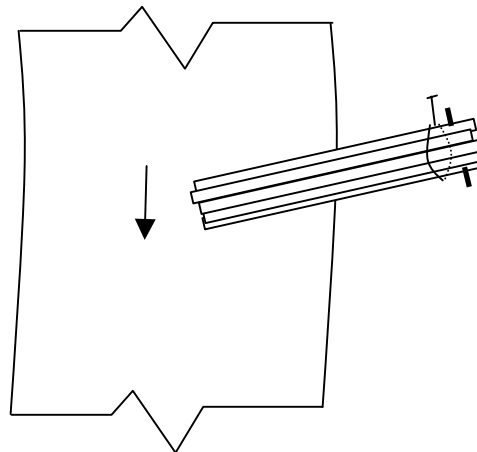
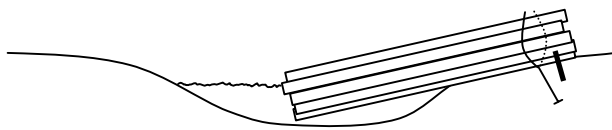
ELWd™ structures installed as ramp logs on Newaukum and Griffin Creeks

Drawings

ELWd™ structures as bank protection and lateral cover logs.



ELWd™ structures as ramp or digger logs.



ELWd™ Structures as stumps or root wads.

