BioEngineering Associates, Inc.

Live Building Systems

AN ENGINEERING CONTRACTOR SPECIALIZING IN WATERSHED RESTORATION

California Class A License # 599522

Oregon Commercial General Contractor Level 1, License Number: 19244

April 2011

Company Background

Bioengineering Associates, Inc. is an award-winning, Small Business Enterprise, Engineering Contracting firm, licensed and bonded in California and Oregon. We specialize in watershed restoration activities, particularly, riverbank stabilization/revegetation, riparian vegetation enhancement, in-stream habitat structures, flood plain and terrace stabilization/revegetation and non-point source sediment control. Since 1982, we have been prescribing for and repairing damage to rivers, streams, hill slopes, and roads within a watershed context, focusing mainly on the basins of the Eel, Russian and Napa rivers and other coastal streams of Northern California.

In 2009, we introduced our technology in Oregon, and currently have scoping studies and demonstration projects on the South Fork Coquille and the Lower Rogue Rivers. We conduct regular operations using a variety of the most appropriate bioengineering techniques known in this field of work. We are a turnkey company, that is, we survey, design, obtain the permits for, and do the construction work on, the majority of our projects. We have our own team of experienced scientists, practitioners, supervisors, and working crews, along with our own expert and master equipment operators. Our key supervisors and equipment operators are involved in each project from the initial survey and design, through the end of project construction. This allows for an on the job intelligence that is rare in the field of construction contracting. In the 28 years, since our earliest work, we have achieved an unequalled mastery of bioengineering techniques. Through both the quality and the number of projects completed, we have led the direction in how watershed erosion problems are solved.

Bioengineering technology includes a large number and variety of historically-tested techniques evolved over hundreds of years for restoring damaged terrestrial and aquatic ecosystems. Bioengineering emphasizes structures built of live plants enhanced by technical fabrics, gravel, soil, wood, and rock, to create the basic building blocks that establish the restoration process. These techniques, often referred to as live building systems, create strong resilient riverbanks and watercourses that grow even stronger over time, and on their own, continue the healing process that leads to a long-term stable, self sustaining, plant and animal riparian and riverine community.

Company Project Experience

Bioengineering Associates is a design and construction firm incorporating bioengineering and other related technologies in developing a site-appropriate design for the restoration of damaged streambanks, floodplains, riparian terraces, and instream habitat.

We design and construct live stabilizing/revegetating structures, such as Live Willow Siltation Baffles, Live Willow Brush Mattresses, Live Woven Willow Walls, Live Branch Packing, Coir Wrapped Soil with Live Willow Brush Layer Lifts, Live Vegetated Rock Deflectors (groins), Large Wood and Boulder Structures, Digger Logs, and Instream Logs, (addressing pools, resting and shelter for fish habitat) and various forms of instream grade control and pool forming structures such as Rock Ramps, Cross Channel Weirs, and Boulder Wing Deflectors. We have also used many of these and other techniques in the control and reversal of gully erosion, usually road related and often significant sources of fine sediments in rivers and streams. Previous experience for many practitioners in the Pacific Northwest with instream habitat restoration structures has been a high rate of failure. With bioengineering, living materials bind structures together to prevent failure. Flexible stems trap fine sediments to produce significantly cleaner water while building up riverbanks and terraces to help restore a properly functioning riparian and river system segment.

In order to achieve an engineered, agency-permitted site design, other professional services are often provided under our direction by our network of experienced consultants, all of whom have worked with us for many years on bioengineering projects, incorporating a well established practical understanding of our technology into the calculations inherent in their disciplines.

These additional services include:

a. Hydrological and geomorphic assessments to determine slope, sinuosity (meander dimensions) and stream width/depth ratio.

b. Longitudinal and cross-channel survey; location of relic, buried channels.

c. Biological Assessment(s).

Additionally, as part of our comprehensive design and construction services, we provide the following project related services:

a. Fish habitat/landscape/ecological assessments; including CEQA/NEPA documentation.

b. Flow diversion and dewatering of active work zones in streams and rivers to facilitate in-channel work, while protecting resident aquatic species and landscape features.

c. Irrigation systems and use of erosion control fabrics and best management practices in erosion control.

d. Riparian landscape planning and design, including site appropriate tree and shrub revegetation and planting.

e. Federal and State regulatory agency permit applications.

f. Project specific grant proposal writing and identification of other project appropriate funding mechanisms.

The following Before, During, and After photographs are a few representative samples of the company's bioengineering designs and construction work.

Russian River: Rochioli Winery Streambank Stabilization and Riparian Revegetation, Healdsburg, CA

Above Left: August 2006, Before Restoration.

Above Right: Summer 2006, During Restoration: Live Willow Siltation Baffles and Live Willow Wall.

Above: August 2010, Four Years After Restoration by BioEngineering Associates, Inc.

Russian River: Odd Fellows Recreation Club, Guerneville, CA

Above Left: February 2008, Before Restoration

Above Right: Summer 2009, Construction is almost complete with the Boulder Wing Deflector in foreground, Live Willow Brush Mattress in the center and on the right, the Fish Habitat structure just below the Rock and Willow Lifts.

Above: October 2010, One year after restoration. Vegetated Boulder Deflector on left, Woven Willow Wall and Live Willow Brush Mattress in center and Log/Boulder Fish Habitat Complex on right anchored under Rock and Live Willow Lifts. White flags identify deer exclusion fencing

Dooley Creek: Fetzer Vineyard, Hopland, CA

Above: 1994 Dooley Creek: Before BioEngineering Associates, Inc. Restoration

Above: Spring 2005, Nine Years After BioEngineering Associates, Inc. Restoration

Examples of some of our recent project works are:

2009-2010: Multiple landowners, Forsythe Creek; Ukiah, California
32,000 acre tributary to the Russian River. Multiple living structure techniques used to stabilize and revegetate riverbanks, and create fish habitat along both sides of 1.5 miles of channel. Project included planting riparian uplands with oak, poplar and bay trees. Several temporary stream diversions installed with dewatering for construction of in-stream log and boulder fish habitat structures. Grants written by BE and awarded by CA Department Fish and Game and US Fish and Wildlife Service. A component of the project included hiring (up to a dozen) tribal members and training them on-the-job in bioengineering restoration techniques. Several were again hired for the 2010 construction season to work on other jobs in the area.
Contact Reference: Richard Campbell, Director, Coyote Valley Tribal EPA
Contact Phone: (707)272-7399

2009-2009: Odd Fellows Recreation Center – Russian River; near Guerneville, California
Re-constructed riverbanks, stabilizing and revegetating extensive erosion sites along 2,115 feet of bank. Nine different bioengineering techniques were used, including 1) Live Willow Brush Mattresses; 2) Live Woven Willow Walls; 3) Rock and Live Willow Brush Layers (Branch Packing); 4) Coir Wrapped Soil with Live Willow Brush Layers; 5) Deep Cluster Plantings; 6) Roughened Channels to replace erosion causing culverts; 7) multiple Log and Boulder Fish Habitat Structures; 8) Vegetated Boulder Wing Deflectors; and, 9) storm water pollution prevention techniques. Use of an in-stream Floating Siltation Curtain enabled work to be performed within the channel while preventing sediments from entering the stream flow. An extensive irrigation system was installed, along with deer exclusion fencing maintained on-site by the OFRC staff.
Contact Reference: Jack Davies
Contact Phone: (707)763-9199

2008-2008:
(A) Francis Ford Coppola Winery – Bear Canyon Creek; Rutherford, California
Construction of a series of Cross-Channel Boulder Weirs and Step Pools with Log and Boulder Fish Habitat Structures to enable fish passage past a 130 year old dam (fish barrier.) Creek diversion and dewatering enabled extensive, deep excavation to place Boulder Weirs on stable ground. Included bioengineered bank stabilization and stabilization of a road related landslide using rock and Live Willow Branch Packing along the lower slide section and Coir Wrapped Soil and Live Willow Brush Layers in the upper half.
Contact Reference: John Polley, Owner Representative
Contact Phone: (707) 967-7157

(B) The Bluffs, Mad River Estuary; McKinleyville, California
We stabilized/revegetated 1300 feet of 26-40 foot high vertical eroding cliffs to protect homes and county infrastructure. Extensive structural use of Coir Fabric- wrapped Soil and River Gravel Layers sandwiching Live Willow Brush Layers separated every 60 ft. to 80 ft. by massive Boulder Groins with multiple redwood logs installed below mean water level for fish habitat improvement. We deployed a floating sediment containment curtain in tidal conditions with 8ft variation in water levels successfully keeping construction generated sediment fines out of the stream flow. Extensive irrigation system installed. The project was completed on time and under budget to the satisfaction of the client agency and local population.
Contact Reference: Chris Whitworth, Engineer, Humboldt County; California Department of Public Works: projected costs of $1.5 million funded by NRCS.
Contact Phone: (707)445-7377

2007-2008: Selby Creek Restoration; Calistoga, California
Stabilized and revegetated streambanks and riparian terraces along 8,700 feet of channel. Included cross channel rock weirs for gradient control and improved in-stream pool habitat. Project Grants written by BE and awarded to the project totaling $1.2 million from CA Water Quality Control Board and the CALFED Program.
Contact Reference: Ann Baker, Selby Creek Watershed Partners
Contact Phone: (510)926-2557

2006-2007: Russian River - Rochioli Winery Streambank Stabilization and Riparian Revegetation Project; Healdsburg, California
Installation of 15 Live Willow Siltation Baffles, 6 Boulder Wing Deflectors, and 65 feet of Live Willow Brush Mattress, 107 feet of Woven Willow Wall and 287 feet of Live Willow Brush Layer in order to stabilize and revegetate 750 feet of eroding banks along the Russian River.
Contact Reference: Joe Rochioli
Contact Phone: (707)431-7119

2004-2005: Russian River - Beringer Blass Wine Estates Project; Asti, California
Redirected 1500 feet of the Russian River into an existing secondary diversion channel, conducting a major fish rescue operation, and reconstructed the riverbank and a flood terrace with material from the mid-channel gravel bars. A Live Willow Brush Mattress was constructed to successfully stabilize and revegetate the 1,000 feet of riverbank, together with Live Willow Siltation Baffles used to stabilize/revegetate a riparian terrace below the newly constructed riverbank. Local fallen trees were incorporated into fish habitat structures, which together with the live willow siltation baffles that created shoreline alcoves, resulted in superb and stable fish habitat that has increased in plant diversity on its own. Extensive irrigation system installed and maintained by the vineyard staff. Project grant written by BE and funded by California Water Quality Control Program.
Contact Reference: Jeff Collins, General Manager
Contact Phone (707)963-7115

Workshops, Seminars, and Trainings:

Experience training Native Americans

- On-the-job training with several (12+) members of the Coyote Valley Band of Pomo Indians during construction of the Lower Forsythe Stream Bank Restoration Project on the Russian River. Several workers returned the following season (2010) and worked with us on other local restoration project sites.

- On the job training with members of the Round Valley Tribes working both on tribal land and then on private projects off tribal land for several years.

- Agreement with the Pinoleville Pomo Nation to provide on-the-ground training for tribal members during construction of restoration activities on tribal lands.

Experience training local labor in bioengineering technologies:

- Vineyard/farm labor: Trained and employed local farm crews in bioengineering restoration techniques site-specific to landowner's restoration problems. In each case we were working on a major river or streambank repair site funded by the landowner or a combination of landowner and grant funding. We "on site" trained and employed the farms labor crews at Fetzer Vineyards in Hopland, California; Beringer Blass Vineyards in Asti, California; Turley Wine Cellars St. Helena, California; Stulmuller Vineyards in Healdsburg, California; and, Rochioli Vineyards in Healdsburg California. This worked both to our advantage and the landowner's. At the first Fetzer project restoring Dooley Creek, which extended over a period of three years and thousands of feet of streambank, we brought in our own experienced team of six to eight crew members and worked with six to twelve of their farm labor crew depending on availability. By the third year of the project we supplied one supervisor who worked with a mostly experienced and well trained crew of up to fifteen farm workers.

Other Training Experience:

- The United States Department of Commerce NEAP Program, together with the Humboldt County Resource Conservation District "On the Job Training" of displaced salmon trollers.

- Instructor and workshop presenter for multiple years: Salmonid Restoration Federation Annual Conference.

- Salmonid Restoration Federation School of Habitat at U.C. Berkeley's Forestry Campus, Quincy, California.

- Soil Bioengineering for Streambank and Floodplain Revegetation, UC Berkeley Extension, short course.

- National Marine Fisheries Service training in bioengineering techniques.

- California Conservation Corps.

- Five Counties Salmonid Conservation Program: training of county road crews on fish friendly bioengineering techniques for bank stabilization on county roads.

Education/Outreach:

- United States Environmental Protection Agency Annual Conference.

- Workshops for the Napa County Resource Conservation District, Yolo County Resource Conservation District, and Mendocino County Resource Conservation District.

- Russian River Landowners Association and tour sponsored by the California Department of Fish and Game and Bodega Bay Marine Laboratories.

- Lecture for the Russian River Council at the request of the Army Corps of Engineers.

- Workshop at the first California statewide Riparian Habitat and Flood Plains Conference.

PROJECT MANAGEMENT TEAM

Evan Engber

President and CEO: BioEngineering Associates, Inc.

Experience: Surveys, Design, and Construction

Over 28 years of experience restoring rivers, streams, and hill slopes and erosion gullies using Bioengineering Technology; working primarily in Mendocino, Napa, and Sonoma Counties of California. Mr. Engber has been involved in the design and construction of the near 150 projects that Bioengineering Associates has performed since its inception.

Role: Chief Bioengineer

Current Professional Registration: Oregon Commercial General Contractor Level 1, License Number: 19244. California General Engineering Contractor License Class A #599522

Awards and Professional Recognition:

- 2003: Governor's Environmental and Economic Leadership Award: Certificate of Recognition of meritorious contributions to environmental protection and resource conservation in the State of California.

- 1998: Consultant to the State of California Resources Agency, Dept. of Fish and Game for "Bioengineered Erosion Control", the first bioengineering to be included in the California Salmonid Stream Habitat Restoration Manual,"

- 1994: Awarded the U. S. Environmental Protection Agency's Hal Wise Award, "For exceptional leadership in promoting the control of non-point sources of water pollution and ecological management and restoration of watersheds."

John Gardiner MBE, PhD, PE

Role: Project Management; Engineer

Years of Experience: 40 years

Education: Ph.D. (River Basin Planning); B.Sc., Civil Engineering

Current Professional Registration: Professional Engineer, Oregon

Project Experience:

- 1985-1990: Project Director, Jubilee River. Creation of a major "second River Thames" bypass channel (around Windsor Castle, England.) Multi-disciplinary data acquisition, characterization and multiple alternatives assessment, leading to routing of 7 miles of new River Thames flood bypass

channel. Involved aerial survey, hydrodynamic and physical modeling of river system and floodplain. Featured extensive new habitat areas for fish, amphibians, wading and diving birds and other wildlife, together with protections for encouraging species with special needs. The process won accolades for stakeholder involvement in a special landscape unchanged for 400 years; expenditure in excess of $200 million was implemented with no opposition.

- 1986-2001: Produced the UK's first Floodplain Management Plan for 20 miles of the River Thames, involving multiple local authorities and agencies, land-use mapping and characterization. Involved aerial survey and hydrodynamic modeling of river system and floodplain. A route for the 10-mile continuation of the Jubilee River was identified within the context of environmental and socio-economic/political use of the floodplain.
- 2000-2005: Adjunct Professor, Portland State University. Taught highly successful Masters-level course in "Watershed Management and River Restoration"; Leadership for Sustainability" (Masters and Entry-level); and "Fluvial Geomorphology" (Masters Level, for the Geology Department.)
- 2003-2005: Member of Independent Scientific Review Panel (ISRP) assessing many project proposals from the entire Columbia River Basin, for BPA grant funding.
- Supervising Project Engineer:

  2004: Reconstruction of 1000 feet of riverbank and flood terrace along the Russian River on Beringer Winery property at Asti, California.

  2008: Mad River Bluffs at McKinleyville CA. Reconstruction, stabilization/revegetation of 30-40ft high eroding cliffs along 1300ft in the Mad River Estuary.

  2009: Odd Fellows Recreation Center near Guerneville, lower Russian River ($1.8million).Revegetation and stabilization of over 2,000ft of badly eroding riverbank with nine different bioengineering techniques to protect remaining redwood trees on peninsulas as well as providing complex fish habitat structures.

Patrick Higgins

Role: Project Evaluation Team Fisheries Consultant

Years of Experience: 20 years

Relevant Experience: Salmon and steelhead restoration planning and evaluation.

- Authored three chapters in the *Long Range Plan for the Klamath River Basin Conservation Area Fishery Restoration Program*, which gave direction to a 20 year State and federal effort. Client USFWS.

- Wrote eight chapters in the *South Fork Trinity River Restoration Action Plan* (Pacific Watershed Associates 1994). Client U.S. BOR.
- Conducted field work and wrote extensive sections of the *Mid-term Evaluation of the Klamath River Basin Fisheries Restoration Program*, which chronicled restoration project successes and failures throughout the basin. Client USFWS.
- Helped design and build the Klamath Resource Information System database (www.krisweb.com) from 1992 to 2005 that is used to track fisheries and water quality trends as well as restoration success in two thirds of watersheds in northwestern California. Client USFWS, U.S. BOR, CA Dept. of Forestry and Sonoma County Water Agency.
- Assisted with fisheries and habitat elements of a restoration assessment of Eel River tributary bioengineering projects in 2003. The finding was that fish habitat had improved as a result of the work, including increased pool frequency and depth. Client California Resource Conservation District Association.
- From 2004-2010 worked for the Klamath Basin Tribal Water Quality Work Group, which is comprised of the environmental departments of five federally recognized lower Klamath River Tribes, and wrote comments and reports on the need for expedient dam removal and improved implementation of the Clean Water Act pollution abatement plans (www.klamathwaterquality.com).
- From 2006 to 2010 Mr. Higgins provided data and technical support to the National Marine Fisheries Service (NMFS) to assist with ESA-listed salmon and steelhead recovery planning in Oregon and California. He then wrote coho salmon recovery profiles for southwestern Oregon populations, which included assessing effectiveness of previous restoration activities and making recommendations for additional needed measures.

Chris Anderson

Role: Bioengineering-Construction Supervisor

Years of Experience: 20 years; 4 years with company

Education: Bachelor's Degree

Other Professional Qualifications

- General Engineering and California Landscape Contractor License
- Certified by Technical Institute of Bio-architecture (TIBA)

Kelly Harris

Role: Bioengineer; GIS/GPS Analyst; Scoping Studies and Permits; Co-Project Foreman

Years of Experience: 4 years with company; 4 years of professional construction experience

Education: B.A. U.C. Santa Cruz in Environmental Studies; Restoration Ecology and Agricultural Ecology.

Gene Wixson

Role: Heavy Equipment Operator and Slope Gradient Specialist

Years of Experience: 45 years

Current Professional Registration: California General Engineering Contractor License Class A #864428

Project Experience:

- Consulting Heavy Equipment Operator and Slope Gradient Specialist for BioEngineering Associates, Inc. for the past four years. Projects participation includes Lower Forsythe Creek, Odd Fellows Recreation Center, Mad River Estuary, and the Selby Creek Restoration Project.
- Completed repair on a 150 foot vertical by 300 foot horizontal slip out on Highway 47 between Clatskanie, Oregon and Mist, Oregon. For this project approximately half of the existing road had been washed out into the canyon below. In order to fix the problem, work began at the bottom of the slope, where soil was compacted from the bottom and advancing upward, until eventually the entire section of road was repaired.
- Completed the construction of several building pads in Benbow, California, including the largest which was 100 feet vertical by 400 feet horizontal and had a 1 to 1 slope. In order to complete this project, soil was compacted in a series, with fabric laid over to ensure stability. To create a long lasting effect the area was then seeded with native grasses. Three years later, this project area has shown no movement and has proved worthy for the construction for a new house, which is currently underway.
- Completed numerous fills and bank repairs on Big Salt Road and Thorne Bay Road on the Prince of Wales Island, Alaska. These repairs varied in size, with the largest having a 100 foot vertical by 600 foot horizontal slope.
- Completed repair of several slides on forest service roads in the Six Rivers National Forests. For the majority of these projects, the slides first had to be dug out in order to eliminate the excess material, before the compaction of the failed road began. Compact lifts were then used in order to rebuild the eroded slope areas and stabilize them from future slides.