Special-Status Species Exclusion or Directional Control
* Wildlife Exclusion Fence *
Highest Performance  Lowest Cost  Zero Waste

Construction Sites
High Visibility Exclusion Fence with Sediment Control Panel and One-Way Escape Funnel shown

Road Ecology

**Triple Function for Significant Project Savings:**
1. Wildlife Exclusion or Directional Control
2. High Visibility Safety Fence
3. Sediment Control

**Turnkey Service:** Fast Response
- Design: Most Cost Effective
- Furnish: Purchase or Rental
- Install: Experienced Installers
- Coordinate: With Site Biologist
- Remove & Restore

**Road Ecology**
ERTEC has the experience which comes with manufacturing and installing millions of feet of Wildlife Exclusion Fence and Directional Barriers for special-status small vertebrates. As the world leader, ERTEC engineers have learned from hundreds of biologists who have guided its innovation and continuous improvement process and expansion of effective configurations and accessories for a broad array of species and conditions. E-Fence™ is patented, durable and the lowest cost species exclusion or directional control system designed for projects in habitat where special-status small vertebrates live. The barrier is designed to exclude small vertebrates from active construction areas and road surfaces, and control movement within fragmented habitat. The barrier is made from a heavy Rigid Polymer Matrix™ which is extruded for strength and durability. The extruded strands of the ERTEC matrix will not separate, stretch or entrap even persistent intruders. Unlike metal mesh, its smooth surface does not present a laceration hazard and unlike mono-filament plastic mesh (found in erosion control products) it will not entangle nor entrap. It will not corrode and decay like metal hardware cloths or geotextile fabrics. Unlike perforated solid plastic barriers, silt fence, or plywood fence, E-Fence allows high wind and heavy stormwater flow-through. By allowing wind flow-through, it avoids the chaotic, turbulent wind currents which are dangerous to animals with moisture-sensitive skin (See Wind Study – Kim 2019). E-Fence™ can be installed across contours (up and down slopes) without the destructive and scouring effects of storm water runoff. It is non-toxic and environmentally safe. Even after extensive exposure to sunlight, harsh weather and salt water it continues to perform. E-Fence provides very high reliability (up-time) which significantly reduces maintenance and monitoring costs. E-Fence can be used for temporary or permanent needs. It is a ZERO Waste solution (reusable, and recyclable). Accepted by wildlife agencies, E-Fence is configurable for individual or combinations of species and flexible for special conditions.

Key System Features:
- **Smooth Rigid Polymer Matrix™**
  - Will not separate, stretch or entrap
  - Anti-climb configuration
  - Will not cause dangerous, chaotic air flows
  - Strong, durable and corrosion resistant
  - Allows wind and stormwater to flow through
  - Non-toxic, animal safe
  - Flexible for sharp elevation changes
- **Configure for Distinct Species**
  - Vary height and trench depth
  - Optional one-way gateways/diversion wings
  - Optional climber barriers
  - Optional visual barriers
- **Option for 3 Controls in Same Trench**
  1. Wildlife exclusion/directional control
  2. High visibility personnel and equipment control
  3. ERTEC high performance sediment control
- **Comprehensive Options/Solutions**
  - Temporary swing gates with ground sweeps
  - No-trench ground seal systems
  - One-way escape gateways
  - Temporary or permanent
  - Cover board refuge

Resulting Benefits:
- **Higher Reliability, Higher Up-Time**
  - No storm water washouts
  - No wind knockdowns
  - No UV degradation
  - Less monitoring, more trust
- **Lowest Total Costs**
  - Fast install, fewer posts, fast removal
  - Negligible maintenance
  - Reduced monitoring
  - Reusable on next or multi-phase projects
- **ZERO Waste**
  - Reusable, recyclable
- **Animal Safe**
  - No entrapment
  - No desiccating wind flow

100% American Ownership, Engineering, Materials, Logistics & Labor
E-Fence™ Options & Accessories:

**Partial List of Options & Accessories:**

- Cover Boards
- Rapid Response
- Height, Trench Depth
- Integrated Sediment Control
- Temp Gates with Ground Sweeps
- Climber Barriers: Lip and/or Belly Band
- High UV Black or High Visibility Orange
- Temporary or Permanent Installation
- Asphalt or Concrete (Hard Surfaces)
- Escape Gateways & Detour Wings
- Trenchless Ground Seal Systems
- Pitfall Trapping Systems
- Full Turnkey Service
- Livestock Control
- Visual Barriers

- One-Way Escape Gateways – Exit
  Earth Bed Funnel/Natural Ramp Shown

- Cover Boards Provide Refuge
  Around Construction Sites

- Flow-Thru Visual Barriers at Base

- Ground Seal Options for
  No-Trench Installations

- One-Way Escape Gateways
  Size Options

- Gate Panels with Attached
  Ground Sweeps

- Low Cost Temp Swing Gates and Panels
  Opening Options 4, 6, 10, 12, 16 and 20’

- Livestock Control
  Electrical Hot Wire

- Sediment Control Panel Eliminates Need
  for separate Silt Fence or Straw Wattles

- Height and Size Options
  For Conditions and Behaviors
Key Factors in Designing the Right Exclusion Barrier

### Key Design Criteria vs. Performance by Exclusion Fence Type

<table>
<thead>
<tr>
<th>Fence Type</th>
<th>Open Types</th>
<th>Solid Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-Fence™ Rigid Polymer Matrix™ (High POA*)</td>
<td>Excellent</td>
<td>Poor</td>
</tr>
<tr>
<td>Metal Mesh</td>
<td>Excellent</td>
<td>Poor</td>
</tr>
<tr>
<td>Solid Barri er Woven Silt Fence</td>
<td>Solid Barrier Thin HDPE Polymer Sheet</td>
<td>Solid Barrier Plywood Sheets</td>
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</tbody>
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#### Stormwater Scouring and Undermining

Stormwater runoff will cause perforated or solid type exclusion barriers to fail in two modes: 1) if installed along contours, head-pressure from ponding against the barrier can penetrate weak points along the trench. Storm water flows will then concentrate and cause unwanted and sometimes severe land erosion. Ponding occurs because the barrier’s Percentage Open Area (POA) is very low, causing it to blind-off to flow quickly 2) if solid barriers are installed up and down contours (which is routinely required), runoff will collect and concentrate along the barrier as it flows downhill. Runoff will scour out the base of the barrier, creating loss of integrity. Weep holes drilled or formed into solid barriers will not allow enough water to flow through (POA is often less than 1%). Weep holes will blind-off very quickly in stormwater events. To control damage, it is important to design with a barrier which has at least 50% Open Area (Open Type) or with a flow rate greater than 600 gallons/ft2/min. Open Type barriers such as E-Fence™ Rigid Polymer Matrix™ allows stormwater to flow through.

#### Wind and its Negative Effects Around Solid Fences

High winds and gusts create turbulent, chaotic flows around solid type Wildlife Exclusion Fences (WEF). Computational Fluid Dynamics (CFD) modeling and field evidence tells us that chaotic windflows on both sides of solid WEFs can desiccate animals with moisture-sensitive skin. Amphibians, which are challenged with the maintenance of water balance, do not normally experience much air flow when there are no fences or barriers because wind velocity stays near zero at ground level. This is not an issue with Porosity Controlled Barriers (i.e. E-Fence™ Rigid Polymer Matrix™) since air flows through, allowing it to behave very nearly as if there were no fence. CFD modeling tells us that solid fences endure exponentially higher drag forces, which can push the fence up and out of its trench, or weaken the structure, leading to premature failure. See Wind Effects Around WEFs - E. Kim 2019

#### Installation on Terrain with Abrupt Elevation Changes

A high percentage of exclusion fence installations are on terrain with some elevation change. For ease of installation, it is important that the barrier material be flexible so that it can be installed even in areas of sharp elevation change. Costly grade preparation should not be required.

#### Animal Safety

Animals should be safe from laceration or entrapment over the duration of installation (for example, silt fence will become more porous over time). Metal Mesh has been known to entrap. Smooth, low friction surfaces, and if an Open Type, rigid immovable strands are important for animal safety.

#### Rate of Decay (UV or Corrosion), Property Retention

Consider Functional Longevity in the face of ultraviolet radiation, heavy weather and/or corrosion.

#### Ease of Installation & Removal Translates to Safety

Consider the weight, density and flexibility of the barrier material, ease of mobilization, average speed of installation, sharp edges, worker safety. Barrier types that require a “J-hook” at base during installation (solid types), which is meant to reduce loss of integrity due to scour, undermining and blow-outs, become “locked-in” when soil hardens and are very difficult to remove.

#### ZERO Waste

Why solve one environmental challenge by creating another? Exclusion barriers should have zero impact on landfills. Consider barriers with readily available recycle streams and that are easy to remove and transport.

#### Design & Installation Support - get the job done right!

When working with special-status species, design and installation support for successful installations is critical. Some barrier types are designed expressly for special-status species and supplied by companies that provide both design support and on-site crew support at no additional cost. Other types are supplied by generic construction supply with little or no pre- or post-sale support.

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Leadership: Hundreds of Projects, Proven Results

A Growing List Accepted by Wildlife Agencies

Some examples:
- Alameda whip snake
- Arroyo toad
- Blanding’s turtle
- Blue racer
- Blainville’s horned lizard
- Blunt nosed leopard lizard
- Butler’s garter snake
- California red-legged frog
- California tiger salamander
- Chiricahua leopard frog
- Coachella Valley fringe-toed lizard
- Corn snake
- Common snapping turtle
- Desert tortoise
- Dunes sagebrush lizard
- Eastern box turtle
- Eastern fox snake
- Foothill yellow-legged frog
- Giant garter snake
- Giant kangaroo rat
- Gray rat snake
- Loggerhead sea turtle
- Mojave fringe-toed lizard
- Mojave ground squirrel
- Northern cricket frog
- Northern red legged frog
- Ornate box turtle
- Texas horned lizard
- Rattlesnake (all species)
- Riparian brush rabbit
- Tipton kangaroo rat
- Salt marsh harvest mouse
- San Bernardino kangaroo rat
- San Francisco dusky-footed woodrat
- San Francisco garter snake
- San Joaquin antelope squirrel
- San Joaquin whip snake
- San Joaquin kit fox
- Santa Cruz long-toed salamander
- Stephens’ kangaroo rat
- Western hognose snake
- Western pond turtle
- Wood turtle
- Yellow mud turtle
- Yosemite toad

Unlike silt or perforated solid fences, a key advantage of E-Fence™ is that it can be installed across contours without concern for stormwater scouring and washouts.
Cost Saving Multi-Function Barriers

**Single Function E-Fence**
1. Exclusion Barrier

Solution Shown: E-Fence Black, 48” with one-way escape funnels on 150’ centers

**Double Function E-Fence**
1. Exclusion Barrier
2. High Visibility Safety Barrier eliminating the need for a separate construction safety barrier

Solution Shown: E-Fence Orange, 48” with the climber barrier facing towards sensitive habitat

**Triple Function E-Fence**
1. Exclusion Barrier
2. High Visibility Safety Barrier
3. Sediment Control Panel eliminating the need for separate silt fence or wattle

Solution Shown: E-Fence, Orange, 48” with Sediment Control Panel using ERTEC’s leading sediment control technology
End-to-End Service and Support

ERTEC Provides Rapid Response End-to-End Service and Support for the Engineer, Biologist, and Both Bidding and Installing Contractors.

When protecting special-status species, it is important that information and support flow quickly and comprehensively through the supply chain. The project must be setup for success!

For the Owner and Specifying Engineer
- Automated design guide, designer’s checklist
- Advice on best practices and budgetary worksheets
- Advice on the most cost-effective solution
- Installation drawings (PDF)

For the Bidding Contractor at Bid Time
- Help interpreting project plans
- Advice on equipment, crew size, production rates and methods
- Advice on unusual conditions

For the Installing Contractor
- On-site training or videos to assure the job gets done right with the best means and methods
- Advice on special conditions
- Advice on removal, reuse and recycling

For the Field Biologist
- Availability for Q&A
- Training and support
- Seek feedback for continuous innovation and system improvements
NEARING 1,000 PROJECTS  
PROVEN RESULTS

Specify E-Fence™ with Confidence
Construction Projects  
Road Ecology Projects

PROVEN PERFORMANCE
Since 2004, Over 4 Million Feet

TRIPLE FUNCTION
Options:
1. Wildlife Exclusion
2. Construction Safety
3. Sediment Control

MARKET INNOVATOR
Wide-ranging experience and
expertise feeds continuous
improvement process

E-Fence™
Wildlife Exclusion &
Directional Control

LOWEST TOTAL COST

ZERO WASTE

TURNKEY SERVICE OPTION
• Design, Budget, Coordinate, Install,
Remove, Restore, Rental Option

RAPID RESPONSE

GUARANTEED PERFORMANCE
you put your name on it, we do too

Contact ERTEC® to learn about the
important reliability, wind, water
and anti-climb advantages of
E-Fence™ Rigid Polymer Matrix™

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