



# **California Kingsnake Field Capture Methods, Tactics, and Recommendations**

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- Trustee-North American Herpetological Education and Research Project (HERP)
- One of the Original founders of N.A.F.H.A. and H.E.R.P.
- 35 years of field experience with California Kingsnakes in California, Arizona, and Mexico.

# Field Capture Methods

- Detailed Artificial Cover Placement Strategies
- Detailed Rock Turning Strategies
- Detailed Road Cruising Strategies
- Detailed Existing Debris Searching Strategies

# Detailed Artificial Cover Placement Strategies

- Types of Artificial Cover (AC)
- Best Size of AC Cover Placements
- Where to Place AC
- Placement Prepping
- Length of Time For Placement to Produce Best Results
- Covering AC to Hide from View





# Types of AC

- **Plywood**-Most Common type of AC, Easy to Find, Inexpensive, Good All Around Cover.
- **Metal**-Expensive, Harder to find, Limited Conditions, Extremely Productive at Times. Use When Available.
- **Rubber**-Very Expensive, Really Hard to Find, Great All Around AC. Use When Available.

















# Artificial Cover Size

- **Best Plywood Thickness-**  $\frac{1}{2}$  Inch (12.7 Millimeters) or Thicker  $\frac{5}{8}$ in. (16mm) or  $\frac{3}{4}$ in.(19mm), Will Produce the Best Results in the Semi Arid Island Environment. It Will Hold Moisture Under the AC for Longer Periods of Time, and Help Maintain a Mild Temperate Range When Compared to Thinner Boards.

# AC Size Continued

- **Best Overall Size** -4 ft x 8 ft (1,200 mm x 2,400 mm) AC Pieces will Produce the Best Overall Results.
- **Most Productive Sizes** -3 ft (914 mm) x 3 ft (914mm) and Larger Should be the Most Commonly Used AC Sizes.





# Cover Placement

- 1/3 Over Holes or Cracks, 1/3 Right Next to Holes/Cracks or Along Rodent/Lizard Trails, and 1/3 Without any Underground Access.
- Mix it Up South Facing, West Facing, Bottom of Ravines, Top of Hills or Knolls, East Facing, and North Facing.
- All of the Above, Allow for a Wide Range of Options for Different Conditions and Times of Year.





# AC Placement Prepping

- Rake out Anything That Might not Make the AC Sit Flat and Fairly Close to the Ground, This Includes Rocks, Sticks, Excessive Grasses/Plants, Uneven Dirt Mounds, Etc.
- Dig Small Access Points on one or two Sides, Match With Rodent Trails When Possible.
- At Least 3 Sides Should be Sealed Away From the Elements, and Keep any Open Sides Away From Wind.
- Cover AC With Vegetation, Sticks, and or Dirt, to Prevent Eye Sore.
- Vegetation Should be Standing Along the Edges.







Not  
Good



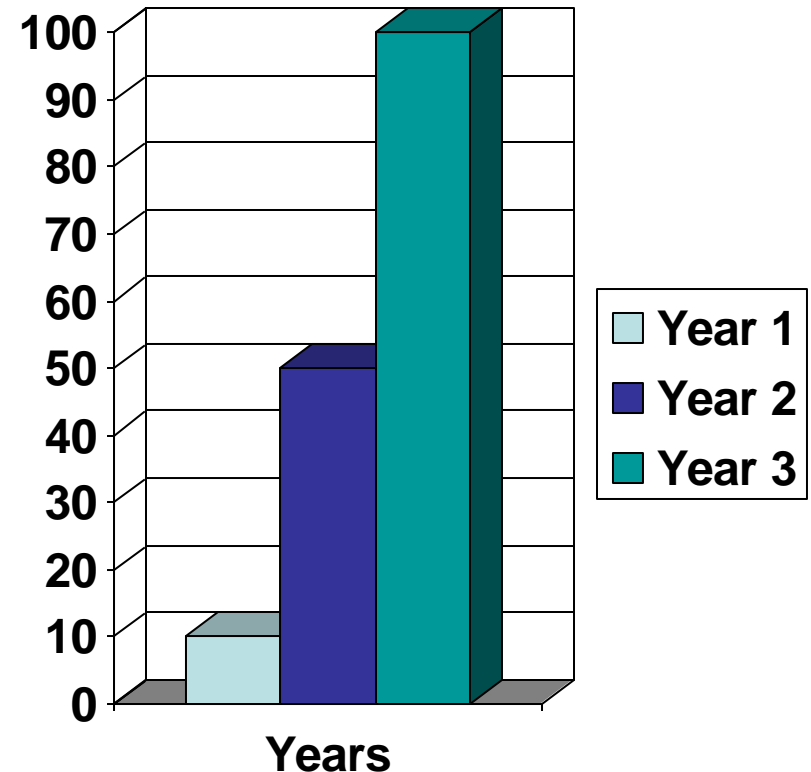






# Length of Time For Placement to Produce Best Results.

- Any AC Placed Should be Left Alone for at Least One Year Before Checking.
- AC will be Most Productive 3 Years After Placement.
- Think Long Term with AC Placement.
- Place AC during Summer/Fall only.















# Covering AC to Hide from View

- In Order to Prevent Eye Sores and Eye Pollution of AC Coverings, AC can be Covered with Dirt, Vegetation, and Other Natural Objects.
- Small Knolls, Slopes, and Bushes can Used to Hide View of AC From Residents and Roads.
- Make Sure to Map Covered AC with GPS Marks, and or Place Groups in Lines with Visual Land Marks.





# Detailed Rock Turning Strategies

- Looking Under Rocks can be Productive at Certain Times of the year.
- Search for the Best Rocks to Look Under. Each Rock Type Will Give Clues to What is Turnable.
- Look for Holes Leading Under the Rocks, and or Discolored Rocks that Seem out of Place.
- Large Rocks Hold Moisture for Extended Periods of Time.





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# Rocks Continued

- Small Rocks Heat Up Fast for Great Early Season Searching.
- Great Way to Sample Areas Where No Traps or AC Have Been Placed.
- Rock Slides, if Available, can be Extremely Productive on Cool Partly Cloudy Days.
- Replace All Rocks to Previous Position, as Close as Possible, Recover all Edges, Except the Underground Access Points.



























# Detailed Road Cruising Strategies

- **Best Speeds-** 65 to 75 KPH for Straight Sections of Road. 40 to 50 KPH for Curved Areas. (Note Only When Safe, and Within Legal Speed Limits.)
- **Two People** – Having two Sets of Eyes and a Passenger to get out of the car Quickly, to Capture the Snake, Before it Escapes is More Productive than Having Just a Driver.





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# Road Cruising Cont.

- **Wind** – Windy Conditions Always Favor Road Cruising Success.
- **Curbs and Shoulders** – Always Watch Along any Curbs, Barriers, or Walls as Kingsnakes will Often Crawl Along Them for Long Distances, Especially High Traffic Roads. Shoulders Should be Watched as well in High Traffic Areas.
- **Dusk to Dark-** The Dusk to Dark Time Frame Often Produces Good Success Rates. Kingsnakes are Extremely Wary and Warmed up During this Time, so Being Quick to Capture is Important.





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# More Road Cruising

- **Daytime High Temperatures-** Daytime Highs of Over 28 (C) Degrees are Needed for Road Cruising to be Most Productive. Mild Daytime Highs Allow kingsnakes to Move at All Hours of the Day, thus Lowering the Success Rate, During any Given Time Frame.
- **Best Ground Temperature Windows-** 19 (C) to 25 (C) Degrees. It's During this Temperature that the Most Activity Will Occur.
- **Road Cruising Provides Limited Results-** Road Cruising is a Fairly Expensive Method, that Provides Limited Results, Resources may be Best Used Elsewhere.



# Detailed Existing Debris Searching Strategies

- **Junk Piles**
- **Road Side Trash**
- **Abandon Homes**
- **Abandon Barns**
- **Concrete Foundations**
- **Dead End Roads**
- **Back Yards**
- **Dirt Roads**
- **Farm Edges**
- **Fallen Wood Fences**
- **Old Fallen Signs**
- **Carpet**
- **Concrete**
- **Asphalt**
- **Plastic**
- **Wood Piles**
- **Cardboard**
- **Palm Fronds**
- **Tarp**
- **Rubber**
- **Vegetation Clumps**
- **Roofing Shingles/Tile**





Tránsito Sau el Perolete, Canary Islands, Spain  
Address is approximate



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# Detailed Existing Debris Searching Strategies

- Scouting and Searching for Debris should be a Continuous, Endeavor.
- Make Notes of Possible Places to Revisit, when Convenient to Investigate Further.
- Great Method for Searching Edges of Known Kingsnake Distribution.
- Various Debris Fields in Different Habitats Allow for a Wide Range of Options, Covering Many Different Conditions.



# More On Debris Searching

- Keep Notes on Time of Year and Conditions of Failures and Successes of Various Sites, Trends Should Start to Develop.
- Use Satellite Imagery, and Visual Searches.
- Gain Permission from Land Owners, When Needed.
- Example Satellite Scouting Notes- 28.009931 - 15.465332 Various Objects Along Down Slope of GC810. Unknown Type; Concrete, Rocks, Trash? (South Facing). Map Marked (Future Notes Once Investigated go here)











# Debris Types

- **Cardboard/Paper**- Good when Sunny and Hot, Very Poor when Cold and Wet.
- **Junk/Wood Piles**- Bottom of Pile Good when Dry, Cold or Hot. Upper Sections Good when Mild.
- **Concrete**- Good under a Wide Range of Conditions, Holds Moisture and Heat, Along with Being Slow to Heat Up.
- **Asphalt**- Good Under a Range of Conditions, Holds Moisture and Heat, Along with Being Quick to Heat Up for Early Season Kings. Always Check Second Layer, if possible.
- **Plastic/Trap**- Decent Under Mild Conditions, Poor During Cold Spells.
- **Carpet**- Good when Hot or Dry, Poor when Cold or Very Wet. Retains Moisture and Repels Heat. Search Inside Folds as Well as Underneath. Pick up and Shake out Smaller Pieces.
- **Metal**-Very Good Early Season and Under Mild Conditions.



# Debris Types Continued

- **Wood-** Good, in a Variety Weather Patterns.
- **Black Rubber-**Excellent when Cold and Mild, Remains Fairly Good even when Dry. Retains Moisture and Heat.
- **Roofing Shingles/Tile-** Good During Mild Conditions, Retains Heat. Search Through Different Levels, including Bottom, when Possible.
- **Palm Fronds/Vegetation Piles-** Good when Hot, and Very Poor when Wet or Cold. Search All Levels.
- **Car Doors/Hoods-** Good Under a Wide Range of Conditions, Sometimes Found Inside the Hood/Door itself.
- **Misc Items Kingsnakes Have Been Found Under or Inside Of-** Mattresses, Box Springs, Couches, Chairs, Bricks, Astro Turf, Flooring, Fuel Tanks, Pallets, Oil Containers, Hay Bales, Garage Doors, House Doors, Glass Windshields, Clothes, Blankets, Hub Caps, Tires, and Most Everything In-Between.



















# **Field Tactics**

- **Working the Weather  
Conditions for Best Results**
- **Helpful Tools**
- **Correct Cover Replacement  
Tactics**



# Working the Weather

## Conditions for Best Results

- **It's All About the Weather-** The Weather Determines What Places and Methods Should be Targeted for Any Given Time Frame.
- **Overall Ground Moisture-** Kingsnakes will Sit Above Ground for Extended Periods of Time, If the Ground Moisture Levels are Moist. They will Crawl and Keep Above Ground Surface Activity to a Minimum when Dry. Levels of Ground Moisture will Vary from Location to Location.



# Weather And Conditions Cont.

- **Tactics When Dry to Semi Dry Occur-**  
Search North Slopes, East Slopes, Ravines, And Areas of Tall Vegetation, All of These Places will Hold Moisture for Longer Periods of Time. Also Target Items That Hold Moisture for Longer Periods of Time, Such as; Thick Plywood, Concrete, Large Rocks, Carpet, Rubber, Bottom of Junk Piles, Etc.



# Weather And Conditions Cont.

- **Tactics During Wet Times and Mild Conditions-** Search South Slopes and West Slopes Along with Tops of Hills. Work Boards, Tin, Rubber, Concrete, Asphalt, Rocks, Plastic etc. It's During These Times that All Resources Should Be Used to Capture Kings Under AC, Rocks, And Debris.











# Conditions Continued

- **Night Time Lows-** Adults will Start to Show in the Early Springs Once the Night Time Lows Rise Above 9 (C) Degrees Regularly. Before This Time YoY and Juveniles Will Be the Main Captures. Extended Night Time Lows Below This for a Few Nights Can Send Kings That Have Underground Access Back Down.



# Conditions Continued Tips

- **Hot Sunny Days-** Good in Early AM Before 11
- **Cloudy Days-** Very Good After Hot or Mild Days Late in Spring.
- **Partly Cloudy Days-** Best



# Weather Watch

- **Watch Radar Closely During Rain Events-** The Difference Between Success and Failure Can Be as Simple as Watching the Local Weather Radar to See Where the Rain is Falling. It May Rain Hard in One Area and Not At All in Another. Target the Rained on Areas 2-5 Days After the Rain Event.



# Tactics And Conditions

- **Be A Sharpshooter-** Be Observant to What the Kings are Doing on Any Given Day, and Once a Trend is Found, Target Those Trends Exclusively, Ignore Everything Else. This Requires Discipline, and a Knowledge of What is Available to Search. In Other Words Play the High Percentage Trends, and Hustle to Check as Many Places Where Those Trends are Happening, as Humanly Possible.



# Last Conditions

- **Once The AC And Debris Season Ends-**  
Trapping, Road Cruising, and Above  
Surface Encounters Should Be in Full  
Swing... Estimated AC/Rock/Debris  
Season for Island Would Be from Oct to  
Early May Depending on Rain Fall, with  
Late Feb thru April Best...







# Helpful Field Tools

- **Good Leather Gloves-** This One is A No Brainer, but They Should Not Be Forgotten or Left Behind. Gloves Provide Protection and Help Grip Large Items that May Need to be Lifted.
- **Sturdy All Metal Hammer-** It Should Have a Straight End and Not Curved. See Picture. Hammers are Wonderful Tools for Lifting Concrete, Asphalt, and Small Rocks, Especially Those that May Be Partially Buried. Also Hammers Work Great for Quickly Digging Tunnels Under Items in Order to Create Paths for the Kingsnakes to Use in the Future. Last but Not Least is The Hammer Digs Extremely Well and on Occasion A Kingsnake or Two Well Have to Be Dug Out from Underground to Prevent it from Escaping.











# Tools Continued

- **High Quality 4 Pronged Potato Rake-** This is The Most Essential Tool for the Field. It is Great for Lifting AC, Tin, Cardboard, Wood Piles, Rocks, Logs, Large 4x8's, Vegetation Piles, etc. It is Also an Important Tool for Doing Prep Work to AC, as it Lifts Out Grass and Dirt Easily. It Allows One to Use it to Cover the AC as Well. Works Well on Searching Rodent Nests Under AC, and Reaches Around Bushes with Ease. No Tool is More Important.





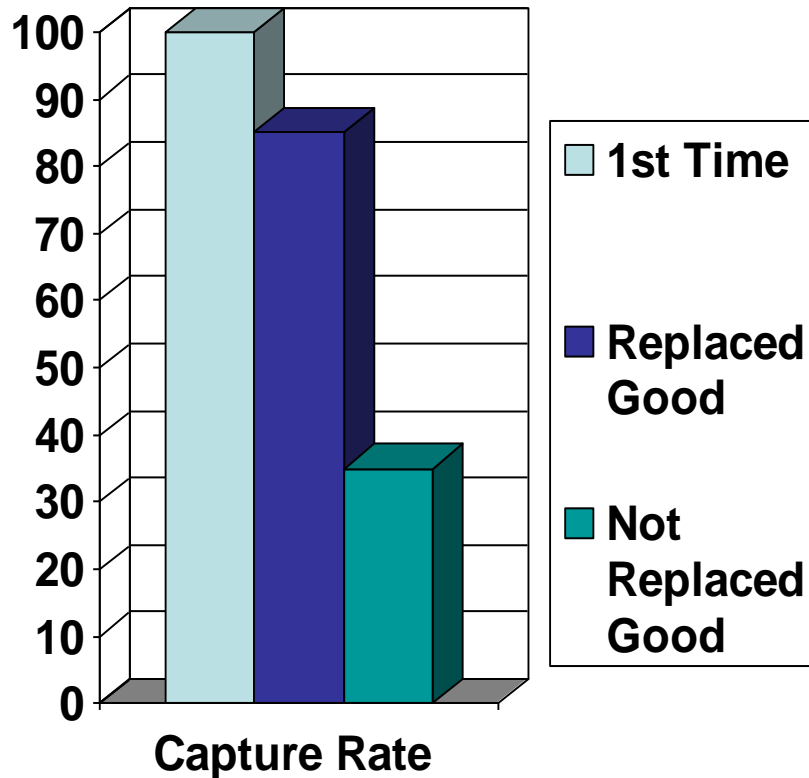
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# Correct Cover Replacement Tactics



- **1<sup>st</sup> Time-** First Time Items Are Checked For The Year.
- **Replaced Good-** Items Tactically Replaced.
- **Not Replaced Good-** Items Randomly Replaced.





Not

Good







# Correct Cover Replacement Tactics

- **Pivot Point-** Every Item Checked Should be Lifted Using a Pivot Point, Preferably the Same Pivot Point Every Time. Often Times this is; the Side with the Most Vegetation, the Down Side, if on a Slope, or Against a Wall/Rock or Other Object. Use Foot as Pivot Point When Unsure. Having a Pivot Point Helps Keep the Item in Place, with a Good Seal and Vegetation Intact.



# Cover Replacement Tactics

- **Pre Lift-** After Choosing Pivot Side, the Other 3 Sides Need to Have All the Vegetation Pulled Back Away from the Item Being Lifted to Prevent it from Falling Back Under the Cover After Being Lifted.







# More Cover Replacement

- **Careful Replacement-** Once a Cover Item Has Been Checked, Make Sure the Vegetation and Any Other Objects are Out of the Way Before Setting it Back Down (**Important Step**). Replace the Cover Item Back Down Tight to the Ground, Make Sure Tunnels Leading Under the Cover are Clear, and Replace Vegetation and Dirt Over the Edges of the Cover.







# **Recommendations**

- **Effort Needed to Eradicate the Very Prolific, Successful, and Secretive Kingsnake.**
- **Plowing, Disking, and Bulldozing.**
- **Closing Thoughts on Considering Extreme Measures When Possible.**



# Effort Needed to Eradicate the Very Prolific, Successful, and Secretive Kingsnake.

- **Conservative Estimate of Kingsnakes on Island-**
- 10 Kingsnakes per Hectare (Conservative #)
- 100 Hectares per sq km.
- 40 Sq km
- $10\text{kings} \times 100\text{ha} = 1,000\text{km} \times 40\text{km} = \mathbf{40,000\ Kings}$  Minus 50% (unsuitable Habitat) = 20,000 Kingsnakes-Minimum.
- Breeding Females 5%  $\times 20,000 = 1,000$  Breeding Females  $\times 8$  Eggs Per Year = 8,000 Kings Born Per Year with Very Little Competition and Very Few Predators.



# California Kingsnakes

- **California Kingsnakes-** Kingsnakes Spend Most of Their Time Underground, or Just Above Ground, when Moist Conditions Allow, This Seems to be Especially True When Prey is Abundant. When They are Above Ground, Kings Like to Stay Hidden in Grass, Bushes, and Along Edges, Rarely Venturing into Open Areas in Daylight. Much of Their Activity, in the Open, Occurs During Lowlight Times; Warm Cloudy Days, Dusk, and Nightfall. This is Not a Species That Can Be Eradicated IMO, and Even Suppressing the Population, Will Require Tremendous Effort and Resources.



# Recommendations

- **100 AC Items per Hectare (200 Best)**
- **10 Traps per Hectare (20 Best)**
- **Concentrate Efforts on The Frontlines of Invasions.**
- **When Possible Use Natural Landscape Barriers to Hold Frontline.**
- **Have Dogs Trained to Search for Kingsnakes Exclusively.**
- **When Possible Construct Snake Fences to Aid Natural Barriers on Frontlines.**



# Plowing, Disking, and Bulldozing

- Kingsnakes Do Not Dig Very Well and Plowing, Disking, and Bulldozing (BD&B) Will Kill Those of Them that are Underground at the Time.
- Areas that Historically Saw This. Should be Redone.
- This Tactic Should Be Considered Where and When Possible, and Landowners Encouraged to do this Regularly.
- Work Frontlines Regularly.
- **Note**-Obviously, This Tactic Should Not Be Employed if There are Endangered Species to be Concerned with.



# Closing Thoughts

## **Extreme Measure Considerations**

- \* Encase Invasion Areas with a Snake Fence.**
- Plow Massive Amounts of Invasion Areas and Front Lines.**
- Consider Biological Research to Search for “Safe” Solutions.**



# Questions?

- Thank You for Allowing Me the Honor of Attending Such an Important Event.

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