

Summary of 1-2 November 2016 Raven Management Workshop

This document summarizes the results of individual breakout groups and a collective brainstorming session at the November 2016 Raven Management Workshop. First, the synthesis of the collective brainstorming session is provided based on discussion of the results of individual breakout groups. This synthesis distills the workshop participants' overall priorities regarding metrics of success of raven management, long-term goals, short-term goals, and research gaps. The next section lists top priorities that were identified by multiple breakout groups relative to factors that influence raven abundance, direct management of raven populations, measuring the effectiveness of raven management, and environmental education/outreach/communication to the public. The last section includes all ideas recorded from each breakout group's flip charts. These are listed in decreasing frequency across groups (i.e., the items lowest on the list were most likely only written by one group).

JOINT BRAINSTORMING

METRICS OF SUCCESS

1. Raven-centric monitoring
2. Decrease in raven populations rangewide
3. Decreased raven presence in wildlands
4. Decline in raven nest densities
5. Sustainable increase in desert tortoise and sage grouse populations
6. Fewer tortoise carcasses because of a decline in predation
7. De-listed tortoise
8. Public and government buy-in and funding support

LONG-TERM GOALS

1. Desert Tortoise Management Oversight Group (MOG) – form interagency group to create a plan to address ravens
2. Create a broader plan than the California-specific Raven Environmental Assessment (EA) for all Western states – do Environmental Impact Statement (EIS)
3. Engage the Western Governors Association (WGA) – start at the top first
4. Multi-level approach
 - a. WGA – 11 states – sage grouse and desert tortoise
 - b. Smaller, local group (MOG ad hoc group) and range-wide sage grouse initiative

SHORT-TERM GOALS

1. Standardized raven monitoring protocol
2. Establish baseline raven population data
3. Re-create raven workgroup (California and beyond)
 - a. Include in raven workgroup: FWS, BLM, DOD, CDFW, local, APHIS, NPS, academia, USGS, NGO's, Desert Managers Group (DMG), and Pacific Flyway
 - b. Others?
4. Regional plan developed and implemented
5. Outreach and education campaign
 - a. Provide funding

- b. Get professional help
- c. Outreach should occur immediately
- 6. Toolbox of mitigation measures/best management practices (BMPs)
- 7. Raven documentary – make available after it is aired (date Spring 2017)
- 8. Fund research for fertility control
- 9. Consider surrogates to determine management effectiveness
- 10. Distribute/post a) workshop summary, b) raven video link (after airing date), and c) workshop presentations (see https://www.fws.gov/nevada/desert_tortoise/dtro/dtro_meet_events.html)

RESEARCH GAPS

- 1. Effectiveness of management measures
- 2. Most effective way to reduce raven population
- 3. Standardized raven monitoring protocol
- 4. Do ravens cause human disease?
- 5. Standard list of minimization measures for new energy projects
- 6. Percent of population reduction needed for biological effect; determine raven threshold
- 7. What is the footprint of control around site?
- 8. Effectiveness of Raven EA
- 9. Time of year when predation occurs (not just focusing on during breeding season)

TOP PRIORITIES FROM BREAKOUT GROUPS

TOPIC 1: FACTORS THAT INFLUENCE RAVEN ABUNDANCE

- 1. Human behavior
- 2. Water sources are potentially most important subsidy - map and target
- 3. Roadkill is a major subsidy in more remote areas - need measures to address
- 4. Addressing access to nesting substrates is essential - prioritize and target nesting substrates in high tortoise densities and habitat potential

TOPIC 2: DIRECT MANAGEMENT OF RAVEN POPULATIONS

- 1. Strategy
 - a. Outreach, partnering, and building coalitions with local organizations and groups
 - b. Build trust with animal welfare advocates
 - c. Prioritize geographic locations for lethal versus non-lethal removals
 - d. Exit strategy – plum, process, and long-term solutions
 - e. Engage/encourage local area working groups (LAWG's)
 - f. Habitat improvements
- 2. Lethal removal
 - a. Migratory Bird Treaty Act (MBTA) – improve permitting process (speed and cost) and increase amount of take
 - b. Need more regulatory flexibility for removal and raven control efforts
 - c. Study to compare removal intensities
 - d. Prioritize removal areas – habitat type, exit strategy, breeders versus non-breeders, high density desert tortoise areas with a lower density of ravens
 - e. Focused removal – local versus population

- f. Remove nesting ravens from conservation areas
- g. Need study to compare targeted versus broad scale removal efforts
- h. Use only humane removal techniques
- 3. Non-lethal removal and management
 - a. Nest removal (especially in tortoise conservation areas)
 - b. Use deterrents (landscape scale)
 - c. Nest removal and/or hazing of nesting attempts may be an effective tool
 - d. Sterilization
 - e. Explore alternative technologies and strategies to change raven behaviors and reduce raven numbers and impacts
 - f. Need more regulatory flexibility for raven control efforts

TOPIC 3: MEASURING THE EFFECTIVENESS OF RAVEN MANAGEMENT

- 1. Monitor
 - a. Raven population
 - b. Effectiveness using surrogates
 - c. Focus on point subsidies
 - d. Number of nesting pairs in conservation areas before and after removal
- 2. Standardized raven abundance method
- 3. Determine consensus of meaningful monitoring metrics
 - a. Agency consensus
 - b. Comprehensive – animals, subsidies, scale
- 4. Ensure funding for effectiveness monitoring with projects and ensure use of info for future projects
- 5. Increase use of citizen science - use appropriate technology (apps); reach consensus

TOPIC 4: ENVIRONMENTAL EDUCATION/OUTREACH/COMMUNICATION TO THE PUBLIC

- 1. Strategy
 - a. Bring in education experts and external PR firm (private-public relations firm (like Sage Grouse Initiative approach))
 - i. Smart outreach - lessons learned (i.e., wild horse outreach experience)
 - ii. Smart roll-out/communication strategy
 - iii. Develop talking points – standardized across partners
 - iv. Make the issue tangible - get people informed/empowered/engaged
 - v. Explore and choose best delivery mechanism options (i.e., website, social media platforms, print)
 - vi. Maintain trust
 - vii. Public engagement - focus outreach to those you can inform and solicit involvement
 - viii. Know your audience – targeted approach for outreach
 - b. Educate ourselves – in-reach; learn from mistakes and successes
 - c. Promote LAWG's
 - d. Congressional affairs – local, county, cons. districts
- 2. Tasks
 - a. Convert DMG raven documentary to PSA or online video (airing Spring 2017)

- b. Peer-to-peer communication within agencies and organizations and to partners
- c. Fund education and outreach!
- 3. Educate kids
 - a. Find ways to draw the human connection
 - b. Incorporate social media and other online platforms to focus on kids and aid in effectiveness data collection
 - c. Citizen Science

BRAINSTORMING SESSIONS FROM BREAKOUT GROUPS

TOPIC 1: FACTORS THAT INFLUENCE RAVEN ABUNDANCE

- 1. Obstacles
 - a. Major subsidies that need to be addressed:
 - i. Perching, roosting, and nesting subsidies
 - 1. Mine sites
 - 2. Energy facilities – geothermal, oil and gas, etc.
 - 3. Renewable energy facilities - solar developments and attached t-lines, wind turbines
 - 4. Powerlines – defunct and currently in use
 - 5. Cell towers
 - 6. Communication towers
 - 7. Towns and cities – buildings and billboards
 - 8. Junk – abandoned vehicles, appliances, etc.
 - ii. Water subsidies
 - 1. Livestock - troughs
 - 2. Wildlife - guzzlers
 - 3. Irrigation
 - 4. Towns and cities - landscaping
 - 5. Recreation sites – water spigots
 - 6. Agriculture – irrigation and pivots
 - 7. Illegal water sources
 - 8. Urban wildlife interface
 - iii. Food subsidies
 - 1. Natural - dead animals
 - 2. Roadkill concentrations
 - 3. Campgrounds – trash
 - 4. Towns – trash, landscaping water, perching structures
 - 5. Bivouac sites – military
 - 6. Insect eruptions
 - 7. Hunting gut piles
 - 8. Fertilizer application
 - 9. Rest areas - lack of trash cans along exits
 - 10. Agriculture - nut trees other than pistachios, stone fruits
 - 11. Translocations – desert tortoise
 - 12. Rendering facilities (livestock, roadkill)
 - 13. Aggregation of human activity

- 14. Landfills – subsidy taken care of?
- 15. Urban wildlife interface

2. Strategy

- a. We should focus on biology and science
- b. Do what we can – make a difference
- c. Prioritize low-hanging fruits first
- d. Address “hard” problems, sequential strategy (e.g., design poles for new project, replace old poles over time)
- e. Must address costs
- f. Internalize externality
- g. Identify constraints
- h. Identify local subsidies – not rangewide subsidies
- i. Create incentives for voluntary subsidy reduction: raven proof bins, compliance, positive reinforcement
- j. Emphasize regulatable (e.g., solar) entities rather than individual behavior
- k. Determine what can be done using regulatory mechanisms versus altering human behavior
- l. Develop a decision support system model (spatial, subsidy) and prioritize focal areas
- m. Increase DT fencing – ravens patrol roads for roadkill but this subsidy is not getting much attention

3. Lasers

- a. Deny access to nest to fail during late incubation
- b. Visual/audio cue to associate nest failure with specific towers - more research into nest failure and towers (would it work in successive years?)
- c. Focus on artificial areas
- d. Study lasers to haze ravens when they are looking for nests

4. Focus on areas with chains of subsidies

- a. Energy developments
- b. Recreation
- c. Agriculture
 - i. Connectivity of towns/agriculture
 - ii. Concentrated versus dispersed agriculture
- d. Waste generation
- e. Roadkill removal in remote areas

5. Regulations and compliance

- a. Apply local regulations and enforce compliance
- b. Lack of public awareness about raven issues and regulations
- c. Commercial compliance with trash container standards
- d. Follow solar regulations lead for raven management plans
- e. Develop BMP's for: energy, livestock, waste management, and trash
- f. Address mitigation follow-through and pushback

6. Coordination

- a. Should occur between and within management agencies
- b. Maintain interagency raven management communications

7. Address subsidies by determining:

- a. Abundance and distribution
- b. Temporal aspects of when ravens are there (i.e., nesting season more spread out, more on edges in fall)
- c. Still using subsidies but also using local food sources (desert tortoise)
- 8. Water most important resource for ravens
 - a. Map water sources
 - b. Target sites in remote areas and reduce accessibility (if possible) of all other sources
 - c. Non-target wildlife issues of denying other species water
 - d. Water equals the highest fledgling rate
- 9. Education and outreach
 - a. Need people skilled at outreach
 - b. Educate and ask what we want – both sectors, utilities and shareholders
 - c. We need to tell our story better – we suck at telling our story
 - d. BMPs for agriculture production - promote and distribute range-wide
 - e. Create a positive public attitude towards reducing subsidies for ravens
 - f. People don't know about expansion of ravens and threats they post to environment, wildlife, etc.
 - g. Living Desert Education Program – have them communicate with researchers, agencies, and public
 - h. Human presence - ground scraps and trash
 - i. Human behavior – education, signage enforcement, and feeding ravens
 - j. Sign ATV trails, user-created roads, and staging areas
- 10. Other ideas
 - a. Add red-tailed hawk to raven monitoring program
 - b. East Mojave (nesting subsidies) versus West Mojave (food subsidies)
 - c. Ravens not problem in East Mojave
 - d. Always consider raven intelligence
 - e. Nesting substrate – manmade structure removal could reduce serviceable nesting areas (could affect red-tail hawks but could selectively deny ravens)
 - f. Data needs: powerline locations, guzzler sites, subsidy data, fragmentation edge effects
 - g. De-emphasize perching sites (because also used for nesting) and focus on nesting sites (i.e., powerline substrates)
 - h. Raven-proof trash receptacles

TOPIC 2: DIRECT MANAGEMENT OF RAVEN POPULATIONS

- 1. Obstacles
 - a. Staff time and money
 - b. Too many research questions and not enough action
 - c. Poor communication between researchers and agencies
 - d. Bureaucratic inertia – agencies lack effective follow through to make change happen
 - e. Politics and public opinion
 - f. Public perception of lethal means
 - g. Ineffective measures, e.g., perch deterrents

- h. Permits
 - i. Lethal management
 - i. Presumed benefit
 - ii. Must monitor effectiveness (very challenging)
 - iii. Assume large public outcry - 1st nations may consider ravens sacred and need cultural sensitivity
 - j. Issues with:
 - i. MBTA
 - ii. All levels of regulation (local ordinances, state enforcement code, and federal)
2. Strategy
- a. Multi-faceted approach – both lethal and non-lethal needed
 - i. Many tactics necessary to be effective
 - ii. Multi-pronged approach crafted for individual areas
 - b. Planning
 - i. Create raven workgroup
 - ii. Create regional plans that incorporate multiple strategies with tiered individual plans incorporating monitoring
 - iii. Prioritize areas to focus management and use experimental approach
 - iv. Continue with plans in place while working on common goal
 - c. Management officials
 - i. Leverage solar facilities for research/monitoring data and control
 - ii. NFWF REAT fund – use for local community subsidy mitigation
 - iii. Pursue removal of ravens from MBTA
 - iv. Use local ordinances for revenue stream by enforcing compliance with subsidy-reducing regulations
 - d. Use public affairs strategy perfected by experts to move public opinion
 - e. Instill fear in some ravens so they will teach others
 - f. Turn off faucet of subsidies
 - g. Reduce raven reproduction and populations
 - h. Make use of new and old technology
 - i. Manage “bite-size scale” that is measurable
 - j. Acknowledge issue to unleash creative ideas/solutions
 - k. Create a deterrent toolbox - lasers, Techno torts, others
 - l. Identify and prioritize raven-free zones that are in desert tortoise critical habitat
 - i. Prioritize easiest areas and ones that contain higher quality tortoise habitat
 - ii. East Mojave is more manageable
 - iii. Focus on high concentrations of desert tortoise and lower concentrations of ravens (map and target areas)
 - iv. Study to compare removal areas and how to determine success
 - m. Raven-proof translocation areas – monitor to derive information
 - n. Manage ravens – small projects not effective (manage regionally)
3. Regulations and compliance:
- a. Depredation permit
 - i. Increase numbers
 - ii. Determine effectiveness

- b. Remove ravens from MBTA or other options to improve management of numbers (i.e., listed species management, target appropriate areas/groups)
- 4. Lethal management
 - a. Prioritize target populations and areas
 - b. Bounty
 - c. Remove large population aggregations
- 5. Non-lethal management:
 - a. Sterility measures (aka birth control) - Ovo control
 - b. Biological control (?)
 - c. Lasers
 - i. Prevent nesting and roosting
 - ii. Can be motion detected or manually operated
 - iii. Pinpoint laser attacks on individual birds more effective than general laser in vicinity
 - d. CTA – conditioned taste aversion
 - e. Egg oiling
 - f. Techno-torts – use shock system or CTA chemicals
 - g. Nest and egg removal and management
 - i. Associate with nest building and clutch size
 - ii. Remove multiple years
 - iii. Remove nests nesting ravens from conservation areas
 - iv. Focus on nest subsidies in wildland areas
 - v. Timely removal of nest and monitor for new nests
 - vi. Target raven eggs – oil eggs with spray from drones
- 6. Energy/solar facilities
 - a. Design upgrades
 - b. Money for research/monitoring
- 7. Address subsidies
 - a. Power tower design – lattice is bad
 - b. Design upgrades – poles, cell towers, power towers
 - c. Remove subsidies at a time when tortoises not available as alternative
- 8. Research
 - a. Winter populations/counts movements
 - i. Study on where ravens are coming from
 - ii. Regional movements
 - b. Offending ravens versus broad scale management
 - i. Effectiveness/success of both
 - ii. Observer bias = improve/standardized monitoring
 - iii. Cost/benefit (i.e., cost of moving desert tortoise versus removal of offending ravens); high desert tortoise density versus low raven density
 - iv. Are all ravens offending? Potentially, or are there ravens that specialize on tortoise?
- 9. Education/outreach/information to public
 - a. Citizen Science/SCA interns – raven monitoring
 - b. Educate public on numbers – offending versus non-offending and nest success
 - c. Use models to help identify offending ravens

TOPIC 3: MEASURING THE EFFECTIVENESS OF RAVEN MANAGEMENT

1. Obstacles
 - a. Funding - little to no money for monitoring
 - b. Amount of money to kill one raven is large – could be better spend
 - c. Define goal - Decrease raven numbers or decrease desert tortoise predation?
 - d. Recovery goals mandate monitoring over set duration – changing method resets clock
 - e. Line-distance sampling not agreed upon as best method for monitoring
2. Strategy
 - a. Monitor raven populations – adopt standardized methodologies across range/west
 - b. Front load monitoring of past project onto new project planning
 - c. Monitor at point subsidies
 - d. Use translocated (or juveniles) desert tortoise with raven research
 - e. Start with as many actions as we can and then eliminate
 - f. Need multiple tools available because there may be differences (i.e., geographically, population levels, individuals)
 - g. Implement and monitor effectiveness using standardized method
 - h. Monitor raven population size
 - i. Agencies focus on project planning and implementation - make sure project mitigation measures include effectiveness monitoring
 - j. Use alternate methods of monitoring in lieu of line-distance sampling method
 - k. Metric needs to be raven based (i.e., total raven numbers over a large area)
 - l. Adaptive management monitoring (assessment) – exit strategy, outcome and why?
 - m. Figure out tipping point/threshold of juvenile tortoise mortalities
 - n. Use meaningful, quantifiable metrics – find out what is meaningful and measure that
 - o. Establish abundance baselines and desired condition
 - p. Identify raven demographic rates (most important)
 - q. Identify/determine how to monitor effectiveness of management strategies/approach
3. Effectiveness monitoring
 - a. Focus on ravens instead of tortoises
 - i. Quantify link between raven numbers and desert tortoise numbers
 - ii. Monitor juvenile tortoise recruitment in context of raven abundance
 - b. Monitor sage grouse vital rates and lek counts
 - c. Use other surrogate species (i.e., another species that is easier to monitor) to desert tortoise populations
 - d. Standardized raven abundance method
 - i. Standardized collection of data with definitions and protocols
 - ii. Standardized database (i.e., Databasin, cloud server, nesting – incubating, fail, undetermined = standardized)
 - iii. Make database available for the scientific community for research/publication
 - iv. Distribute survey protocol

- v. Identify appropriate scale, which leads to using appropriate measures
 - vi. Regional scale raven abundance versus local scale risk to desert tortoise
 - vii. Use models to study predation on desert tortoise juveniles
- e. More monitoring especially after a policy change
- f. Monitor effects of subsidy removal and other management measures
 - i. Removal using structured model approach
 - ii. ID best approach
 - iii. Need effectiveness of individual strategies but may not be able to differentiate if multiple action taken
- 4. Raven monitoring program through REAT Managers
 - a. Continue current program
 - b. Measure number of occupied and unoccupied territories/nests
 - c. After ravens are removed, does the number of desert tortoises under the nests increase or decrease?
 - d. Does that behavior continue or is it an isolated event for that pair?
 - e. Are there fewer nesting pairs/occupied territories in desert tortoise conservation areas/critical habitat after raven removals?
- 5. Research
 - a. Develop predictive models – probability of raven occurrence
 - b. Proof of concept, interpolate findings, ravens and grouse
 - c. Monitor implementation of research findings – are we doing what we said we would do?
 - d. Allocate effort to inform hypothesis testing – stratify, experimental design
 - e. Active nests/territories – removal (alone) versus removal and subsidy reduction
- 6. Specific ideas
 - a. Incorporate nest locations and removal by into day-to-day work of various people
 - b. Regional study across Mojave – densities and change in abundance
 - c. RFP (Request For Proposals) to present reporting for monitoring and controlling populations
 - d. Examine stomach contents of dead ravens (lethally removed) to determine percent of desert tortoise consumption
 - e. New and existing technology
 - i. Sonar to ID burrows
 - ii. Mini go-pro for tortoise
 - iii. Tethered drone to surveillance sensitive areas
 - f. Headstarting – good place to focus monitoring effort (survivorship for duration of juvenile period and not endlessly)
 - g. Maximize Citizen Science
 - i. Gather data (app like eBird, herb mapper)
 - ii. Mine data from NA Field Herp forms, iNaturalist
 - iii. Get consensus among agencies on utility of citizen science app data
 - h. Find and use existing grants for monitoring
 - i. Missing tortoise cohorts (?)
 - j. Add sampling sites to USFWS dataset using other personnel

TOPIC 4: ENVIRONMENTAL EDUCATION/OUTREACH/ COMMUNICATION TO THE PUBLIC

1. Obstacles
 - a. Public doesn't know/understand issue
 - b. Desert tortoise isn't enough to make public care
 - c. Measuring effectiveness of education is difficult/impossible
 - d. Public is indifferent to lethal control of many predators
 - e. Fear-mongering
2. Strategy
 - a. Broaden to include all of state, many of species of wildlife, agriculture
 - b. Present a larger picture instead of focusing on tortoises and ravens
 - c. Use sociological science to figure out target audience and best methods
 - d. Info needs to be presented appropriately to target audiences
 - e. Monitor public perception to ensure tactics are useful
 - f. Take message to schools – kids are enthusiastic, effective advocates
 - g. Choose a central message for everyone to use
 - h. Make connection with current publicly recognized problem
 - i. Age appropriate messaging
 - j. Organize response to public interested in subsidy reduction
 - k. Empower local citizens with knowledge
 - l. Human behavior change – change how we deal with trash
 - m. Transparency – share our monitoring results
 - n. Use positive reinforcement
 - o. Monitor public awareness and our effectiveness at communicating with public
 - p. Decide what we want to accomplish via public education
 - q. Provide tools for citizen scientists – engage them!
 - r. Empower public to feel ownership of public lands
 - s. Education is only hope!
3. Targets of education and outreach
 - a. Decision makers
 - b. Restaurant owners (desert communities)
 - c. Desert residents (rural)
 - d. Desert recreationists
 - e. Environmentalists
 - f. Agriculture
 - g. Children
 - h. Litterers
 - i. Businesses with trash receptacles
 - j. Local government (Caltrans)
 - k. Waste management companies
 - l. Potential funding sources
 - m. Consumers
 - n. Outreach enthusiasts
4. Effectiveness study
 - a. Public awareness survey
 - b. Trails and trash after raven survey

- c. Nest concentrations near public use areas
- d. Longitudinal education retainment in schools
- e. Hire learning institution or graduate student to develop effectiveness monitoring
- 5. Tangible outreach and education
 - a. Stencil trash receptacles
 - b. Stickers
 - i. Artist – Tim Shields?
 - ii. Post in all campgrounds, on all picnic tables, and at all rest stops
 - iii. Like the “Crumb Clean Campaign” or “Keep it crumb clean”
 - c. Create signage for:
 - i. Open areas (OHV)
 - ii. Direction signs
 - iii. Tourists
 - iv. Interpretive signs
 - v. Billboards
 - vi. Cities, towns, and small businesses (reduce trash and accessible water)
 - d. Create brochure/campaign for “No backyard breeding”
 - e. Interpretive sign with QR follow them where the go – then follow-up with those who may stop
 - f. Video kiosks of ravens killing desert tortoises
 - g. Visual messaging of raven depredation of desert tortoises
 - h. Urinal cakes in the shape of ravens “Hit the raven and why”
 - i. Inspirational desert images contrast with raven images
 - j. Raven story messages: trash must be bad for ravens, too many ravens bad for desert tortoise and other species (including sage grouse), relate ravens to rats, ravens carry disease (?), the Birds movie, ravens attack other birds, must hit urban centers
- 6. In-person outreach and education
 - a. Outreach presentations/messages to organizations
 - b. Outreach to outdoor and recreational groups
 - c. Travel around desert and train other educators and interpreters on raven issues
 - d. Show off tortoise to kids to emphasize:
 - i. Human connection
 - ii. Rarity and continued decline
 - iii. Interaction with tortoises (i.e., pets)
 - iv. Live tortoise experience at various locations (i.e. rest areas, headstart visitor center) with raven presentation
- 7. Social media
 - a. Social media platforms data: exposure, specific page, game use, budget/funding follow through get people outside of desert interested
 - b. Desert tortoise App for encounters with photo and allocation
 - i. What’s its status?
 - ii. Pokemon-Go style app
 - iii. Game to help gather data or education
 - iv. Incorporate into existing apps (i.e., Jewel’s get outside app) demonstrating link between desert tortoise and ravens

8. Specific ideas

- a. Coordinate with utilities and other organizations (e.g., water, waste power, etc.) to create outreach (i.e., ads, pamphlets, and social media) and reduce raven access
- b. Coordinate with Waste Management – notice on invoices, trash cans, icon on dumpsters, many pests, not just ravens “Don’t feed the pests!”
- c. Think of a catchy slogan (e.g., “a fed bear is a dead bear”)
- d. Messaging should be multilingual – English, Spanish, German, and French
- e. Coordinate with county officials that deal with smaller projects – trash abatement program
- f. Redirect REAT and DMG funding to PR firm
- g. Get Sacto engaged
- h. Educate kids in the desert on tortoise and ravens – teach about trash and food
- i. Advertising budget – PSA’s, billboards, TV ads
- j. Raven video – convert for online use (i.e., YouTube, etc.)
- k. Partner with zoos to demonstrate raven eating
- l. Use NRCS/RCDs to approach agriculture industry
- m. Use citations and tickets
- n. Create a reporting hotline
- o. Cal State Parks
 - i. “Keep it crumb clean”
 - ii. Measure effectiveness
 - iii. Bring in a specialized group
- p. Ken Holmes – Caltrans rest stops and install informational signage
- q. Determine behavioral compliance (control group Joshua versus East Mojave) - use a specialized group of experts to calculate effectiveness
- r. Raven Awareness Week (spring?) – nature centers (show desert tortoise-raven predated shells) and special events that tie in Citizen Science
- s. Corporate messaging to restauranteurs and fast food
- t. Cost of ravens on commodities (e.g., pistachios)