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DOGS RUNNING FREE - CHASE DEER, AND THEE

by

Bill Krumbein

Change. The only thing constant in life is change. Progress cannot be made, adaptation cannot succeed, survival cannot prevail without change. Is it time we take a look at our policy on dogs in parks? To change it?

Prior to 1967, our dog rules were quite different from what they are today. The 1947 Field Manual says:

> **To protect the wildlife which adds to the interest of the park...**
>
> **Dogs are prohibited in State Parks from 8:00 P.M. to 7:00 A.M., except seeing eye dogs.**

In other words, dogs were allowed in day use areas on leash, but were banished from staying overnight in campgrounds. This policy stayed in effect until July, 1967, when

> **...Director Mott announced that the 22-year ban against the keeping of dogs overnight in state park campgrounds would be lifted, effective October 1, for a trial period of one year. In signing the order ending the ban, he said, "this wil give dog owners the chance to prove they can keep their pets overnight in state park campgrounds without lessening park enjoyment by others." (October 1967 NEWS & VIEWS.)**

The trial period had mixed results. In the first three months of the rule change, the greatest single violation was visitors allowing animals to run loose; but the big complaint was from the mess the animals created. A year later, the California Parks and Recreation Commission, after a lengthy discussion, by a 4-3 vote extended for another year the experimental regulations allowing campers to keep their dogs in state parks.

> **Since disregard for the regulations was a principal cause of complaint, the Commission instructed the Director to see that the rules are sternly enforced, and that dog owners be made aware that this is their last chance to retain their newly granted privilege." (September 1968 NEWS & VIEWS.)**

A staff report showed 10,733 warnings had been given, but only 88 citations issued. "Director Mott warned that pets would be shut out of campgrounds unless there was a decided improvement in their behavior. Since last year's verbal warnings apparently weren't enough, rangers will cite owners whose pets misbehave." (October 1968 NEWS & VIEWS)

The next year proved different. Approximately 100,000 dogs camped with their masters in state parks. "A total of 521 citations were issued for various infractions of the dog rule...the majority of these citations were issued for dogs off the leash. Warnings were up, to over 14,000 versus about 1,000 the previous year. The prevailing sentiment in headquarters mail, somewhat pro-dog the first year, reversed sharply during the second year." (October 1969 NEWS & VIEWS)

In years that followed, as reported in NEWS & VIEWS, December 1969, "The Commission also passed a resolution requesting the Director to put the temporary regulation permitting dogs to camp overnight in the state parks on a permanent basis." December 1970 NEWS & VIEWS, "For the first time there will be a $.50 charge for dogs." February 1972 NEWS & VIEWS, "By unanimous vote, the Commission approved the new regulation requiring all dogs entering state parks either have a valid license or proof of rabies innoculation."

Twenty-some-odd years have gone by now, and most of us do not know what it was like before dogs were allowed to camp overnight. It has been the "norm" dealing with dogs and dog owners in campgrounds.

Dogs and society and natural resources have seemed to survive for 8,000 years or so without leash laws. But in today's society, leash laws are required as a simple fact of life, just as there are laws prohibiting playing drums in libraries. If it were just that simple for people to understand. The crux of the issue, and really why I've taken the energy to write this article, boils down to the question, "would dogs on a leash pose a threat to our park's resources?" I think not.

Last year I received a letter from a park user who would very much enjoy walking her dog in the park. She feels that our dog rules are unfair..."People who don't care do what they want anyway and caring people abide by the law and are deprived of an enjoyable

experience."

She went on to relate how she sees all kinds of wildlife at Springlake Regional Park while walking her dog there, leashed at all times. Later I explained to her about our policy where dogs are only allowed in developed areas of the state park system, but my answer seemed superficial. She had made her point, and I agreed with her.

Back in the early 1970s, a naive ranger trainee, I was told by other rangers that even the mere scent of dogs would send the wild animals fleeing. We told the public this to "explain" our rules. That concerned dog owner I just talked about received a letter from Region reiterating this same 1970s philosophy. This misinformation is comparable to telling people that ticks must be twisted clockwise (or counterclockwise) for removal, or that does will abandon fawns touched by humans. Either may happen, but it's not the norm.

> "As you know, I have a great interest in this area (scent marking from dog urine, scat, tracks, etc.). My personal experience is that it has no effect on the behavior of those species that have not been harassed repeatedly by dogs. Scent marking by mammalian species is highly developed, but for the most part species specific." (Buddy Goatcher, wildlife biologist)

I have received confirmation from a variety of wildlife specialists; and I agree with their conclusion that leashed dogs don't bother the wild animals very much.

At Annadel State Park dogs are permitted on our entrance road (1 1/2) miles and parking lot. Some folks walk their dogs every day along our road. Even with the vehicle traffic, the frequency of wildlife sightings (my opinion) is not very different from sightings in the park's interior, where dogs are not allowed (but some people take them anyway, leashed and unleashed).

Pig hunter/wildlife biologist Buddy Goatcher used his dogs everywhere in the park. Some nights they would cover more than 20 miles of park and game trails. His dogs were very well trained. They chased only feral pigs. So his dogs left their scent all over the park--the frequency of wildlife sightings (my opinion) was no different than what they were before our pig eradication project began.

Wondering if my observations were valid, I sought the input from a variety of wildlife experts, asking them what they thought the effects of leashed dogs were on wildlife population.

I. L. Brisbin, Jr., Adjunct Associate Professor, University of Georgia, Savannah River Ecology Laboratory, wrote back, "I agree with you completely that if under proper control (and this is of course the key) such animals should represent no significant impact on native wildlife."

David A. Jessup, DVM, California Department of Fish and Game, Wildlife Investigations Laboratory, writes, "... my personal opinion is that dogs on leashes are not terribly stressful to wildlife. Leashed dogs don't really appear to excite animals much more than people or cars, particularly once they become acclimated."

Buddy Goatcher, wildlife biologist, Animal Damage Control Consultant, Specialist in Feral Swine Problems, knows Annadel State Park well, as it was he who removed 140 pigs in 18 months. Buddy's response: "You are probably right in concluding that leashed dogs have no significant impact on the behavior of wildlife. In particular, park visitors' opportunities to view wildlife would not be severely impacted."

Bruce D. Barnett, Ph.D., Wildlife Biologist, EA Engineering, Science and Technology, Inc., answered, "as to their potential for physically harming resident wildlife within the park, I would say that, if 'leashed,' chances are pretty low."

The real problem would seem not to be the dog, rather the dog <u>owner</u>. "Those few individuals that allow their dogs to run off leash in spite of regulations to the contrary, do much to damage the credibility of all dog owners." (Goatcher)

Presuming leashed dogs are not the problem, then how do we "educate" dog owners?

Sometimes we must use a rolled newspaper, in the form of a citation, to teach dog owners about our rules. I have 18 years experience patrolling park lands, and I see our main problem here as the lack of statewide <u>consistent</u> enforcement. If such is truly the case, no wonder the public is confused about our dog rules.

Park enforcement of dog rules varies greatly among our units from total disregard to active, everyday enforcement. Park visitors may allow their dogs to run

loose in some parks with little or no worry about receiving a ticket--then visit another unit, perhaps in a different district, and get nailed with a citation.

People pretty much know that if they get caught speeding they will receive a ticket. If they get caught running a stop light, they can expect a ticket. Don't you believe if we consistently cited people with loose dogs that it wouldn't take people too long to become "educated" to our dog rules the same way they are educated about speeding and running traffic lights? Consistent enforcement is a must for this to work.

Another aspect as crucial as enforcement involves interpretation with the goal being to teach awareness of the individual's actions upon the environment. Ecological literacy would be another way of putting it.

In the September, 1988, issue of AUDUBON, Ted Williams presents an insightful article, "Why Johnny Shoots Stop Signs." Children who, for a variety of reasons, do not bond with anyone, end up with no conscience. Williams writes, "one of the things we're seeing is that kids are growing up not bonding with nature." We are seeing people, park visitors, who do not have a conscience as it relates to the natural environment--an outdoor ethic. "Outdoor ethics, like any kind of ethics, is simply the final, inevitable stage of a learning process. It cannot be imparted. It comes from within or not at all." (Williams)

Outdoor educator Chuck Roth has concluded that not only is it impossible to teach outdoor ethics, it is impossible to teach anything. "All you can do," he says, "is create learning situations." That we can do in our parks as we interpret to visitors. We can open the door so that good, old fashioned nature study can find a growing place within--and relate how loose dogs affect "nature."

So, are we ready to consider a change in our dog rules? Immediate change would probably prove catastrophic; but with a clear-cut plan with consistent application statewide, it might work. We'd probably need 12-18 months of lots of dog tickets for unleashed dogs--coupled with statewide radio, TV, and newspaper announcements--integrating this into interpretive presentations, and securing the support from dog organizations. Now is a good time to discuss this change.

It's not too different from how Datsuns have become Nissans; that we don't sing in libraries; that you'll get a ticket for running a red light. Basenjis in the back country? Are we ready?

KISS THAT PARK GOOD-BYE?

by
Donna Pozzi

Please take a few moments to think about your favorite place in your favorite park. Visualize your last visit to that special spot. Perhaps you're fortunate enough to work or live near your cherished place. If so, drop everything and go there! Or take out your photo album...

Now that you have a good mental image, let your imagination run wild for a while and make up a list of all the outrageous things that could possibly happen to spoil your sacred spot. If your place is forested, consider logging. Maybe your place is special because it's so remote from any modern development. Imagine the impacts if a 300-unit condominium village were built nearby. Perhaps your visualization has taken you to a 100-year-old building that has all its physical and emotional connections intact. Would your feelings be diminished if this building were converted into a souvenir shop or bed-and-breakfast? Maybe your spot is on a clean stretch of beach, with some of the best surf along the coastline. Add a pipeline or drilling rig...I'm sure you can come up with plenty of your own equally frightening scenarios. But of course none of those things could ever happen to your favorite place because as a park it's protected, right? **Don't count on it.**

We recently learned the hard way that the protection afforded state parklands is much more tenuous than we thought. "Remember Las Cruces" may well become our motto to remind us State Parks are **not** forever, as we'd been led to believe. Take the threat of an incompatible land use adjacent to parkland and the protection becomes even more flimsy.

Our battle for Bodie is going to be a long and tough one. Fortunately at Bodie, we have public opinion on our side. Supporters of Bodie are fiercely loyal. They understand the qualities that make Bodie unique, and they're willing to help us fight to preserve that uniqueness.

Does the place you were thinking about earlier have friends like Bodie's? To whom will you turn when you hear of a possible threat to your park? Have you worked to ensure that your visitors leave with an understanding and appreciation of the park's values? What about the neighbors -- have you sought their support? If you don't have anyone to help you when (not if) your favorite place is threatened, will it be because you never shared it with anyone or cultivated them as prospective park stewards?

We can't afford to wait until our special places -- our parks -- are at risk before starting the public awareness campaign. The sad truth is that they're all already endangered. The good news is that we have the talent and resources to save them. It's an enormous challenge but our abilities as interpreters and our passion for our mission make us formidable.

Before you put your photo album away or leave your special place, make a commitment to save it from harm. Think of **one thing** that you will do. To make sure that you will live up to this commitment, share it with someone else. Or write it up for publication.. All responses will be published. Do it! We dare you! **If you don't care enough to get involved, kiss your park good-bye.**

THE IMPORTANCE OF USING "LOCAL" PLANT GENETIC RESOURCES FOR REHABILITATION IN CALIFORNIA STATE PARKS

by
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Off-Highway Motor Vehicle Recreation Division
and
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INTRODUCTION

The California Department of Parks & Recreation is charged with the responsibility for protecting and preserving the State's outstanding natural heritage, including scenic, geologic, paleonteologic, and biologic resources. This last category represents one of the most important challenges to resource managers, and is also the one that has undergone the most critical review in recent years. This paper focuses on one of the many -- and most poorly understood -- issues surrounding this responsibility: the requirement to protect the genetic diversity of the State's rich botanical assemblage.

In order to maintain the genetic integrity and diversity of native California plants, revegetation or transplant efforts in the State Park System will be from local populations, unless shown by scientific analysis that these populations are not genetically distinct from populations being proposed for use. If local populations have been decimated, the closest existing population(s) to that State Park System unit will be used. (California State Parks and Recreation Commission Statement of Policy Number 7).

Department personnel have often regarded this policy as anything from an esoteric statement with little relevance to practical park management, to an elitist attempt at creating parks that can be appreciated by the "chosen few." To those responsible for adhering to this policy, the task is always difficult, always challenged with more expedient alternatives, and sometimes downright impossible. Yet these same employees agree that carrying out this policy is the essence of proper resource management. We would like to examine some of the justifications for this policy and a few pragmatic considerations for its implementation.

WHY PRESERVE "LOCAL" GENETIC MATERIAL

The world flora contains an immense pool of genes which can be thought of as tiny packets of genetic material that influence the way an organism looks and functions. Plant biologists recognize that the "gene pool" can be separated into discrete assemblages called "species" which possess similar morphological and physiological characteristics. Species of plants have developed naturally on specific sites depending upon the local environment (climate, soils, topography, associated plants and animals) and a certain amount of chance. The designation of a species is somewhat arbitrary in that the possible genetic combinations are almost endless and new genes can naturally arise (through mutation) at any time.

The flora of California is diverse and unique. The state possesses over 6,000 native plant species of which about a third occur naturally only in California: an exceptionally high rate of endemism (Stebbins and Major, 1965). In addition, California has approximately 1,000 species of introduced (exotic) plants, most of which are annuals of Old World origin and commonly considered weeds because they displace native species (Raven, 1977).

The process that a unit manager must follow, of sorting this diverse species assemblage and developing appropriate rehabilitation material for specific sites, is diagrammed in Figure 1(page 9) and explained as follows.

Exotic species are not representative of the natural California flora that we seek to preserve in the State Park System and are generally excluded from rehabilitation programs. Other concerns about exotics are their aggressiveness in displacing natives, and when

used in rehabilitation projects, they often exhibit favorable results initially, but are not successful over a longer time. There is an active policy to remove exotics from State Park Units, viz. eucalyptus, ice plant, tamarisk, and many others.

Even native species (those naturally occurring within the borders of California) can be considered weeds if they grow in areas in which they are not natural, but have invaded because of disturbance (e.g., California poppy, lupine). Any representatives of extraneous communities should be excluded from rehabilitation efforts.

Well defined communities, such as coast redwood or valley oak, can extend over large distances, and many distinct genetic combinations may exist for individual species at the extremes of the community range. This will also be the case for certain species that naturally occur as a component of several plant communities. Care needs to be taken when dealing with non-local gene sources for rehabilitation with most examples being included.

Local genetic sources for rehabilitation should be used because these plants will be best adapted for the site over the long term and will provide a diversity of habitats for wildlife and human enjoyment. Propagating local material will also increase the likelihood that evolution can proceed in a natural course which will ensure the future success of a species and integrity of a plant community. And finally, park units serve as islands in space as they preserve undisturbed examples of California's natural wonders amid a sea of human-induced manipulation (intentional and accidental), and as islands in time that preserve unique genetic combinations in plants and animals that once lost through extinction or contamination cannot be recovered.

What is "Local"?

Often, if there were a truly local source of material (i.e., growing on the site where rehabilitation is needed) there wouldn't be a problem to begin with. We are usually faced with the problem of having to go some distance away from the rehabilitation site, a few yards or many miles, to obtain "local" material for propagation. "Local" is pragmatically defined to mean "as close to the rehabilitation site as you can get" with certain considerations.

The first consideration is physical closeness; how far away can a population of a target species be and still be local? There is no set distance beyond which you cannot go to obtain propagation material. We could designate geographic zones, such as the California seed tree zones, from which material should be obtained, but generally not enough is known about the biology of individual species to allow construction of such a map.

A population adjacent to a rehabilitation site may be so dispersed that collecting enough propagation material for a planned project will require canvassing hundreds of acres spread across diverse ownerships. This can be expensive and time consuming, but is a better alternative than purchasing more readily available material from an undesirable location. It might be possible to collect propagation material from one selected area (inside park boundaries) over several years and store the material until enough is gathered to meet the project design.

A second consideration is "microsite closeness." A population of a species can be adapted to a unique site because of environment (precipitation, incident radiation, soil chemistry). It would not be wise to simply collect the nearest available propagation material for a rehabilitation project. An example in California are conifer species in the Sierra Nevada, where some species extend over a wide range of latitudes and elevations. A rehabilitation project involving ponderosa pine at 3,000 feet elevation could use nearby propagation material from only a few miles way, but which was growing at an elevation of 6,000 feet. However, the 6,000-foot-elevation trees evolved under drastically different circumstances than the 3,000-foot-elevation trees and would not be expected to perform the same when planted at the lower elevation. It would be much better to collect propagation material at a greater physical distance, but which more closely matched the microsite characteristics.

A final consideration is "genetic closeness." It is possible using state-of-the-art laboratory techniques to identify genetic fingerprints for individual species and 'map' selected portions of a species genotype and compare it with other populations of the same species. Individual populations can be identified because of their genetic 'finger prints' that demonstrate what they have or do not have in common. It is possible for different populations of a common species to look alike, but have very different genetic makeups. Mapping of genetic makeups can be difficult and expensive, but should be accomplished prior to introductions of

propagation material from far-away populations or when introducing material from rare or sensitive plant species.

Concerns of Using Local Propagation Material

Some concerns of using Local propagation materials are:

1. It is expensive and time consuming to collect local propagation material. Many native species are available from commercial sources, but they are seldom local enough to meet our needs. There will always be constraints of budget and personpower when planning rehabilitation with locals, but these should be met as well as possible to follow the policy.

2. Gross mistakes of what is local or native. A classic example of this is sea rocket (Cakileedentula var. californica), which was identified and even named as a California native, but was accidentally introduced to California from Europe by early sailors. Careful homework by project planners will identify appropriate locals to use.

3. Interfacing with natural processes of evolution. Nature is constantly reshuffling the genetic deck by long-term or cyclic changes in the environment. Some species may become extinct or extirpated from certain areas by these natural processes, and our rehabilitation attempts will be wasted. We need to understand the species we are working with and what the species' environmental needs are.

4. Inbreeding depression. There is a possibility that our efforts at collecting local propagation material will not be representative of the population, but through some unknown bias we will upset the genetic balance. This could easily happen by collecting seed from a few individuals with copious amounts of fruit during a good seed year or by collecting fruit from the tallest (or shortest) plants because they are the easiest to reach. If we ultimately narrow the genetic base with a biased collection of propagation material (in a sense, allowing incest), then we run the risk of creating a situation for inbreeding depression where lethal and undesirable genes increase in frequency to the extent that the population cannot exist with a normal reproductive system.

5. Local propagation material may not meet the designs of the rehabilitation project. In some cases, erosion control cannot be achieved with native species and more drastic methods will need to be considered. The carrying capacity for wildlife may also decrease under certain circumstances if only local natives are used. These concerns must be balanced against the overall goal of maintaining genetic correctness in our park units.

Some overall guidelines for selecting and using local propagation material are presented in Table 1 (page 10). No matter how local the genetic material is it will eventually change as new gene combinations are created through natural evolution. The important thing to remember is that our goal is to preserve processes and not objects. The policy of using local propagation material will ensure that our parks maintain their exceptional quality.

A Case Study: Sugar Pine Regeneration Project

An interesting case study of what extent we may have to go to follow the policy of using local propagation material is presented:

Sugar pine (Pinus lambertiana) is a common forest tree throughout the Sierra Nevada and northern Coast Range of California. Some of the most remarkable examples of this tree (8 feet diameter at base, 200 feet tall) exist in the vicinity of Calaveras Big Trees State Park (CBTSP).

For many years, white pine blister rust, a disease fatal to sugar pine, has been spreading southward in the Sierra Nevada. This is a natural disease, but its introduction and transport in California has been the direct result of human activity in the forest. It is expected that the disease will reach epidemic proportions in CBTSP sometime in the next 25 - 50 years and the sugar pine trees will succumb.

The two easiest solutions to ensure continuation of the sugar pine forest are: 1. plant sugar pine seedlings grown from seed collected from a disease resistant population that is known to exist in the Coast Range, or 2. plant disease-resistant clonal material developed by the U. S. Forest Service derived from trees growing throughout the range of sugar pine in California. Neither of these policies follow the policies of the Department. Another alternative exists in low incidence in the natural pine population at CBTSP of a disease-resistant gene. If allowed to proceed as a natural epidemic, the blister rust will kill all but about 2% of the

sugar pine at CBTSP. All other things being equal, the remaining 2% of the sugar pine could regenerate the site with disease resistant offspring and the forest would reassume its present constitution; however, this is a process that could take over 1,000 years!

A project has been proposed that would save the existing gene source and use local propagation material in a unique way. If careful genetic studies of the existing sugar pine are conducted now, before the disease devastates CBTSP, resistant trees can be identified and genetic material collected. These trees can be cloned by rooted cuttings or *in vitro* micropropagation (tissue culture) so that hundreds of copies of each tree are prepared for replanting in the forest. If a careful planting program is conducted over the next 20 years, CBTSP will have a large component of disease resistant trees. As white pine blister rust spreads at CBTSP the young disease-resistant sugar pine will be virtually unaffected and the forest will continue as a natural system.

This project will be carried on at significant expense and effort on the part of the California Department of Parks and Recreation. The Department policy to preserve and proliferate natural genetic resources provides an important impetus for this project. The citizens of California will be able to enjoy sugar pine forests, and an important natural resource will be saved by such long-term planning and implementation of an important policy.

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Roy Woodward has a B.S. and M.S. in Range Science from Brigham Young University and a Ph.D in Botany from the University of California, Davis. His research efforts for the past few years at UC Davis have centered on genetic tree improvement and the selection of plant materials for revegetation projects. Roy recently joined the California Department of Parks and Recreation as a Resource Ecologist in the Off-Highway Motor Vehicle Recreation Division in Sacramento.

Figure 1. Discrimination process to obtain 'local' genetic material for rehabilitation projects.

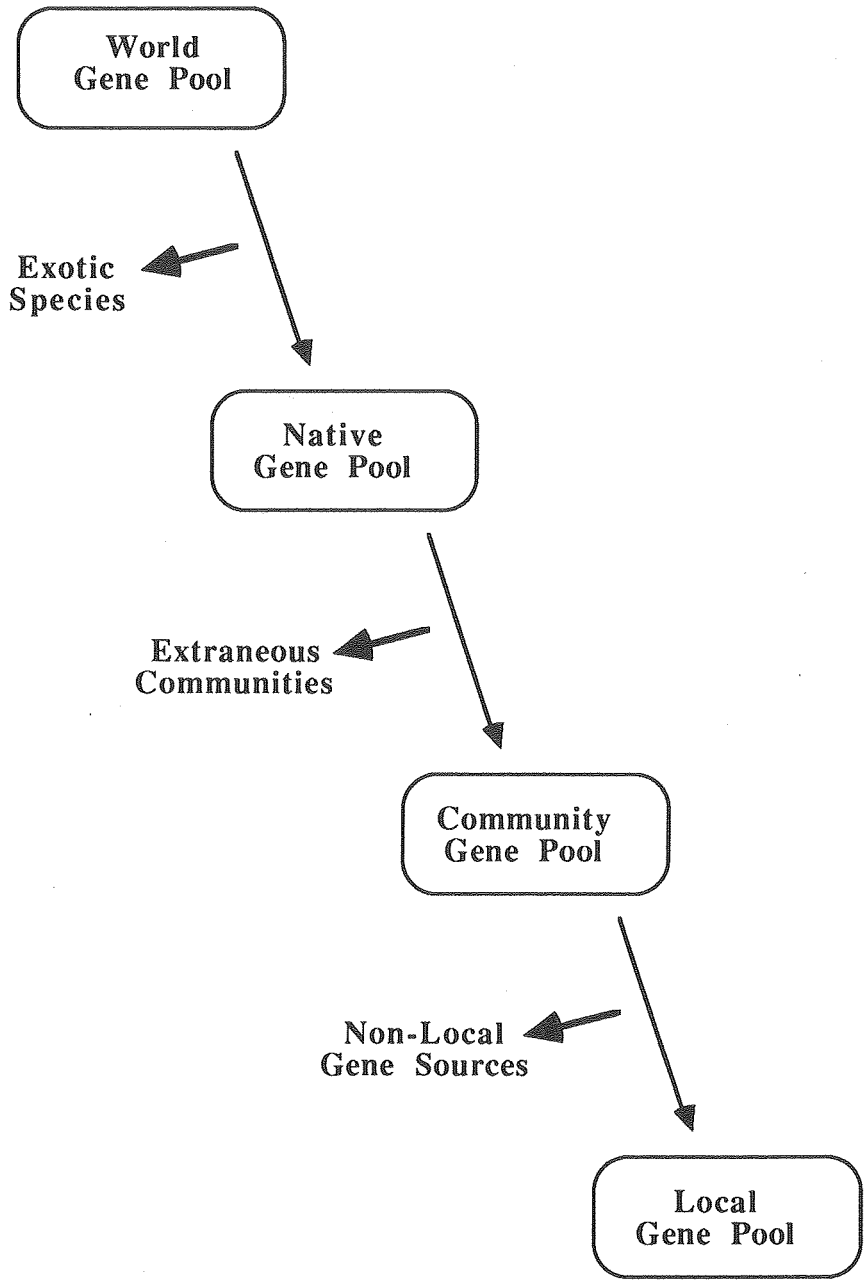

Table 1. Guidelines for planning rehabilitation projects using 'local' genetic sources.

1. What is the purpose of the rehabilitation?
   - erosion control, exotic plant control, aesthetics, interpretation.

2. What species are adapted to the site?
   - what species are the locals.
   - what is the community structure (density, frequency, cover of each species) that you are trying to simulate.
   - how will mixtures of herbaceous and woody plants be accomplished.

3. What site preparation is necessary?
   - stabilization/contouring, burning, plowing, herbicide, fertilization, mulching.

4. What season can you plant?
   - California has spring and winter natives which grow together on the same sites.
   - should you wait for rain to come or for snow to melt.

5. How will the site be planted?
   - broadcast seed/mulch, hydroseed, drilled, plugs/transplants, sticks/bareroot, containerized stock, no planting.

6. What post-planting management or impacts will the site receive?
   - watering, fertilization, weed control, burning, herbivores, wildlife, trampling, flooding, wind erosion.

7. What propagation material should be used?
   - vegetative parts (bulbs), rooted cuttings, dormant cuttings, fruits/seeds, transplants.

8. When and how to collect propagation material?
   - fruit must be present and ripe, but seeds not dispersed.
   - hand collections, mowing/bagging, vacuuming, dormant cuttings.

9. What are handling requirements of propagation material?
   - is storage possible and does it require special temperatures, humidities, or atmospheres.
   - purity and viability tests (necessary to plan seeding rates).
   - preplanting germination requirements (scarification, soaking, heat, cold).

LET'S UN-JERSEYFY THE WEST

Remarks by
Marc Reisner

This article was transcribed by Syd Brown from a speech given at 1988's Conference in Sacramento. I think you will find it of interest. Thanks, Syd!

I have to confide to you that I'm feeling sorry for ENGINEERS these days. That will sound strange to anyone that has read my book. I could hardly be categorized as a fan of the Bureau of Reclamation, even less so of the Army Corps of Engineers. But as our television preachers have shown us lately, it's easy to pity those you've helped dethrone.

Anyway, I feel a bit sorry for engineers because the age of great dams and public works really does seem to be winding down. We used to have titans like William Mulholland and Floyd Dominy building our awesome aqueducts and dams. Now they've installed an accountant as commissioner of Reclamation. I believe the last guy was some kind of dentist. And we have an Interior Secretary -- A WESTERNER!! -- Who not only tells the muscular lobby behind California's last great unbuilt dam to buy the blueprints and build it themselves ... but who has been running around the country talking about tearing dams down.

Now in one sense this is tragic. For we humans are the only creatures who can fathom their own mortality. And this appalling prospect of biological annihilation is, of course, the fountainhead of the creative urge. And I think the creative urge is felt most strongly by three categories of thinking ape: Politicians, Writers, and Engineers. That's why we have so many bad books, bad laws, and bad dams. But now we're telling engineers that their monuments of the future will be laser - leveled fields and solar thermal salt ponds. Two Forks Dam, if built, is being called the last of its kind. Now I believe that two or three years of drastic drought could turn all of this around. Some really monstrous water schemes are sitting on the shelf just waiting for a historical drought. I'll come to that later. But for now we can ask why the era of dams should suddenly end -- not even with a bang, but a whimper.

It's worth pondering why. Demand for water is still growing in the west. The California water project has a projected shortfall of a million and a half acre-feet if no new facilities are built. That's water for seven million people. In California, we are overdrafting our aquifers at a rate of two million acre-feet -- 600 billion gallons -- per year. In the Ogallala Region of the high plains, it's ten times worse. Population growth is rocketing in California, Arizona, and along the Front Range. You can't really say that demand has levelled off.

Nor is it exactly true that we have run out of dam sites. In California, where I live, there are still dozens of sites for new or raised dams. And despite the 1300 dams we've built in California, we still have destructive floods. We had an enormous flood in February 1986. And what about the greenhouse effect, which implies we must depend less on fossil fuels -- which in turn implies greater dependence on hydroelectricity or some other nonpolluting power source? What if the climate changes -- or has changed -- and the west becomes much drier even than it is today? In view of these manifest needs for water, clean power, and flood control, why is the Reagan Administration talking about reorienting, or even dismantling, the preeminent dam builder of all time?

The answer they are handing out today is that water development has "become" uneconomic. It's a bad investment. They're right, if you ask me, but they would have been right thirty or forty years ago, at least where federal irrigation is concerned. As early as 1926, a disenchanted former commissioner of reclamation, Frederick Newell, was calling the reclamation program an "expensive sentimentality." Besides, governments invest in uneconomic ventures all the time, even government as broke as ours. Our agricul-

ture policy amounts to spending billions to subsidize production here and spending more billions to subsidize non-production there. That's hardly economic. We could invest ten billion in energy conservation and save a hundred billion dollars worth of imported oil, but Secretary Hodel would rather drill for more oil offshore. That's not economic. Star Wars, tobacco subsidies, the doubled deficit -- this administration doesn't give a damn about saving money, as anyone can see.

So it seems to me you can take lightly the explanations proffered for the end -- if it really is the end -- of the great dam era: no more good dam sites, poor economics, and all that. Either these are false constraints, or they are constraints that were in evidence thirty years ago. I think there are more fundamental causes. Three in particular stand out in my mind:

First, the depression babies are no longer in power or with us in this world. I am speaking, of course, of old, powerful men -- Lyndon Johnson, Carl Hayden, Wayne Aspinall, Clinton Anderson, John Rhodes, George Mahon, and others. These gentlemen had three things in common, other than great political power. They were from the west. The definitive experience in their lives was the depression, and to a lesser degree, the great drought of the thirties, the drought that helped create the dust bowl. And third, they watched rescue arrive in the form of public works. Especially dams.

Today, in the Congress, the last powerful members of this cabal number four or five, and they are all southerners. Hayden, Mahon, Johnson, Aspinall -- except for Jim Wright, the Speaker of the House, and a couple of others, they've gone to their reward. The committees with their fingers in water development are now chaired by the likes of George Miller, the young environmentalist from the California's Delta . . . and J. Bennet Johnson of Louisiana, who comes from our wettest state . . . and Daniel Moynihan, the scourge of federal waste unless it's intended for New York. Were politicians not mortal, and if committee assignments hadn't fundamentally changed, I think we might now be building Hoover Dams on woody creeks.

Her's a parallel thought: The great catalyzing experience in the lives of the members of the new Congress has not been the depression. It's been America's decline as a technological power. We've seen ourselves challenged - - often humiliated -- first by Germans, then the Japanese, now even by the Koreans and Taiwanese, and God forbid, the French. Our imbalance of trade is absolutely scary. We export soybeans, airplane videocasettes, Levis, "I Love Lucy" reruns, and not much else. If it weren't for a flood of investment money from overseas, our country would be in far worse shape. Just a few years ago we built everyone else's dams, but now third world nations like China, Brazil, and Thailand are using indigenous technology to build their own.

Congress isn't going to drag America out of this spiral of obsolescense by building a lot of new dams to keep the Bechtels and operating engineers' unions employed. The congressional pork barrel is, I think, more durable than Douglas Mac Arthur. It will never die. It will never even fade away. But it's going to begin regurgitating our tax dollars for supercolliders and Star Wars research and other high-tech ventures that will -- one hopes -- help generate superior products and technology that we can sell abroad. The days of "you vote for my dam, and I'll vote for yours" are coming to an end.

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A second reason why water development has fallen on hard times is this: The water development lobby consistently underestimates the power of the environmental lobby. It does so because the environmental lobby consists of a few hundred salaried people operating on shoestring budgets who have nothing to "give" the voting public. No jobs, no monuments, no huge infusions of cash pumped into the local economy. When I sat on the board of the Tuolumne River Preservation Trust, our entire budget was less than the retainer paid to just one of the lobbyists for the Modesto and Turlock Irrigation Districts. We had no water or jobs or hydroelectric power to offer -- only a beautiful California river preserved in its natural state. We had everything going against us. Yet we won.

To understand why we won you need only consult one of the latest California polls, which revealed that 80% of Californians say they would side with nature in a conflict with economic growth. A similar result just came out of Nevada, of all states. Twenty years ago, this was an absolutely heretical idea, the kind of nonsense you heard from David Brower. Now Californians at least say they believe it. And for better or worse, Californians are notorious for setting national trends.

And this leads me to my third reason why I think water development is currently up against the wall. We simply don't believe in a certain style of technology. I think we are still awed by computers and nuclear magnetic resonance machines and cars like the Acura Legend. What awes us about these machines, however, is their efficiency. A microchip that performs a million functions. A car that can travel 130 mph and still get 27 miles per gallon. What we no longer seem to believe in is the giant-scale technology of the postwar era, whether we're talking about nuclear reactors or Oldsmobile Toronados or freeways or dams.

Freeways are a good case in point. The worst traffic jam in California today is not in Los Angeles. It's across the bay from San Francisco, the bottleneck on Interstate 80 between the Carquinez Straits and the Bay Bridge -- 25 miles of transportable gridlock that moves 20 miles per hour when everything is going absolutely right. If there are a couple of accidents, it can take you nearly three hours to cover the stretch. It's gotten much worse since I moved to the Bay Area in 1978, and will get much worse in the years ahead. I say "will get" because all that's being done to relieve this nightmare is the addition of a couple of new lanes -- in 1995. Highway planners say it would take ten new lanes, plus a new bay bridge, to keep traffic flowing as smoothly in the year 2000 as it did in 1975. How much support do you find for ten new lanes of freeway? Not much. In Contra Costa County, which supplies most of the commuters who are sacrificed to this abysmal mess, there was a big effort not long ago to push a sales tax whose revenues would have been used for emergency highway widening, and it lost. It lost even though the backers outspent the opposition. By 40 to 1.

This turn of events would have been inconceivable a couple of decades ago. To a highway planner, it must seem utterly irrational. But I think a lot of people now believe that new freeways -- and new dams -- don't solve much in the long run. And in the short run they promote more and more of the chaotic, sprawling growth that's turning California and other parts of the west into an arid New Jersey. The problem is that the government has devised no orderly, rational means of regulating growth. So people are resorting to whatever means they can find. In this sense we are becoming a society with an avowedly negative orientation. We're not sure what we want, but we know what we don't want. We don't want new highways but refuse to climb out of our cars. We want plenty of water but don't want new dams.

So we've put the water planners over a barrel. They can't stop growth, yet can't build new dams, and somehow have to come up with the water, that the people who say they don't want new dams are going

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The latest panacea is water marketing. It is probably the one thing that Interior Secretary Hodel and David Brower agree upon.

But it isn't quite so simple. Those paragons of free enterprise who make up the western water lobby are learning that free enterprise is damned expensive if you have to pay for it yourself. Free enterprise also inspires greed among those with something to sell and fear among those with something to lose. That's the real reason you haven't seen much water marketing yet. The farmers, who control most of the water in the west, own something whose value can only increase . . . so they hold out for a higher price. Or if they do decide to sell their water rights, their neighbors who plan to stay put worry about what will happen to them. Every rural community in the west is worried that water marketing will transform it into Appalachia without trees. So water marketing is being thwarted at every turn. Most of it is going on in Colorado. The Berrenda Mesa Water District, in my state wants to sell Los Angeles 50,000 acre-feet.

They can't afford to use it any more. But the Kern County Water Agency, which wholesales Berrenda Mesa its water, won't allow it. They want the water to remain in Kern County. The Metropolitan Water District of Southern California offers to concrete-line the earthen canals of the Imperial Irrigation District and buy the 200,000 acre-feet this would conserve. It makes perfect sense from Imperial's point of view, because they waste so much water -- most of which pours into the Salton Sea -- that they're slowly being flooded off their land. But Imperial also wants $175 an acre-foot for the water that would cost a fortune to save. So there's no deal.

Personally, I think water marketing is an idea that can't be resisted forever. It makes too much sense. But I believe there's another idea lurking about that could complicate things all over again. Let me detour for a moment and talk about it, because I believe it could loom very large in the west's future. I am talking about the concept of public trust: The Mono Lake Doctrine.

When I went to work for the Natural Resources Defense Council in 1972, there was a lot of talk among my lawyer colleagues about public trust. For those of you who aren't familiar with it, public trust, in the legal sense, means a benign, paternalistic ownership. The government -- federal, state, or local -- is the custodian or executor of the people's estate in fish, wildlife, and environmental quality. In the Mono Lake case, the California Supreme Court held that the State of California did not appear to be fulfilling this role satisfactorily enough.. A public resource -- the fish and waterfowl of Mono Lake -- was (and is) suffering apparent harm from state policy: Allowing water to be diverted and shipped to Los Angeles. The court held further that the city's use of this water does not necessarily amount to a perpetual right. It is borrowed from the people of California, and if it can be demonstrated that the diversions are causing irreparable and severe harm to the public trust in natural resources, the city may have to give some of the water back to the lake and its federal systems.

The environmental lawyers with whom I worked for seven years did not file a single action under [the] public trust doctrine. The clean air and water acts came along, and NEPA, RICRA, FIFRA, the whole alphabet soup, and these laws became the fresh-killed carcasses on which my lawyer brethren began to feed. But these laws have been thoroughly litigated and only a few choice morsels are left, so I am inclined to believe we will see some heavy public trust action in subsequent years. Personally, I hope we do. The harm caused to my favorite species of wildlife, ducks and geese, by the loss of wetlands in the Central Valley absolutely beggars the losses at Mono Lake. Ditto the salmon in the streams. The striped bass fishery in San Francisco Bay is going extinct. The salmon are dying out. The sturgeon, too. In each case evidence points compellingly, even incontrovertably, to dams and diversions as the precipitating cause. I hope you would agree with me that we owe it to our descendants to save some of the natural splendor that we and our forebears found here. But even if you are selfish enough to think not, I can easily envision a fair amount of water going back, by court decree, to

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I'm going to use California as a for-instance, because it's the state I know best. It's little different anywhere else. I'm confident this audience knows that agriculture consumptively uses 85 percent of all of the water in California, and even more in other western states. What you may not all appreciate is that it returns only 3 percent in the form of its contribution to the state's economy. If you throw in secondary benefits and really huff and puff, you can push that figue up to 8 or 9 percent, but you may die of a heart attack. Even in New Mexico, which only has one city of any size, agriculture returns just about 18 percent of the state's income -- but uses 92 percent of the water.

This is a situation that cannot persist. In economic terms, it's a gross misallocation of our most important resource. In medical terms, if a substance other than water were involved, it would be called an addiction, a case of self-destructive bingeing. In political terms, I think it means that the growers are going to have to do with less, or find themselves at war with everyone else in the west.

If it came to war, I'm not sure who would win. The cities certainly have the votes, but the farmers are folk heroes in the west -- even old farmer TENNECO and his neighbor, farmer EXXON. Their power in the state legislature is vastly out of proportion to their political and economic importance. But I don't see

things coming to war. I think the growers may soon be begging the cities to buy their water rights, because the west's agricultural base is shrinking fast.

There are a number of reasons why I say this.

Here's Reason Number One: In the San Joaquin Valley of California, we have a million acres of prime farmland being threatened by a worsening salinity and drainage crisis. This problem is endemic to irrigation agriculture: It played an important role in bringing down Mesopotamia. It probably destroyed the counterpart of Mesopotamia we once had on our own North American soil -- the great, but vanished, Hohokum Civilization in Arizona. The macro-technological solutions -- enormous salt-handling drains -- are a fantasy. To build one just for the San Joaquin Valley could cost $5 billion; it's just not worth it, and we can't afford it.

So this essentially leaves the growers with three options. They can retire hundreds of thousands of acres of land, or they can reduce their applied irrigation water dramatically so there's less junk water to be got rid of, or they can sacrifice a lot of land for on-site evaporation ponds. They're probably going to do all of these things, to some degree, and experts I've spoken with think they're going to end up reducing their water consumption at least 15 percent. Spread over a million acres, that 450,000 acre feet saved. That's water for three million more Southern Californians, if there's enough air left for them to breathe.

Reason Number Two: Crop surpluses and depressed prices. In this category, cotton is a wonderful case in point. A couple of years ago, California and Arizona growers were raising cotton that cost them 50 or 60 cents a pound to produce and trying to sell it on a world market whose price had plummeted to 35 cents. It's gone up lately, but like oil, the price could go right back down. The United States doesn't control the world cotton market any more than we control the market in oil or automobiles. Meanwhile, the cotton price support program, which is a polite way of describing multi-million dollar handouts to big cotton growers, has united much of Congress on one agenda item: They want to get rid of it. I don't think these hideously expensive agricultural support programs are long for this world -- not when we have huge deficits, a health care crisis, and AIDS crisis, and three million people living in the streets. But if you take the cotton land in California and Arizona and try to grow something else on it, you'll drive down t:hat commodities price, too. There's way too much cotton land. So I believe we're going to see a fair amount of agricultural land retired for this reason alone.

I made the radical claim that growers of the west may soon be begging the cities to buy their water.

Here's Reason Number Three: Most banks are now trying to make loans not on the basis of a farmer's assets, but his cash flow. Now, this is a terrible development for agriculture, because many farmers are like the fallen European nobility we used to call land-poor. The value of their land is vastly out of proportion to the income they derive from it. They can keep farming if they get loans based on assets -- mainly their land. But if you loan them money only on the basis of farm income, many of them won't be able to farm.

Reason Number Four: That inevitability we're all trying to ignore: higher energy cost. We've been in a fool's paradise for the past six years, and it may last six more. But oil imports are inching upwards all the time, while America's reserves are running out. By 1995 we're suppose to import 50 to 60 percent of our oil. That's a fightening figure -- one that we never reached even in the crisis days of 1973 and 1978. When the price of oil goes up, the price of all energy goes up. In California, growers who buy relatively unsubsidized water from the California Water Project are already paying more than they can afford. That's why the Berrenda-Mesa Water District, which includes some of the wealthiest growers in the state (one owns 160,000 acres) wants to sell enough water for 250,000 people to Los Angeles. When energy doubles you're going to see a lot more water for sale, or at least a lot more farmers with good water rights going broke. Any farmer who has to pay for a pump lift of 400 feet or more will be in terrible shape. That applies to every grower buying water from the brand-new, $3 billion Central Arizona Project - too many farmers in the San Joaquin, to quite a few in Colorado.

Now when I've pursued this line of reasoning in previous speeches, someone has always come up to me and accused me of two things: First, of being a heartless bastard, and second, of wanting us all to starve.

Here we run into another myth about western water -- the most persistent one I've found -- which insists that most of the water applied by agriculture is used to grow food. That's pure nonsense. The biggest water

consuming crop in California is irrigated pasture land -- grass. The second biggest is alfalfa - a higher grade of grass. The third biggest is cotton. Only when you get to the fourth-highest water-consuming crop, rice, are you finally raising food. But the lion's share of California rice is exported.

To use one acre-foot of water you have to flush your toilet about 65,000 times. We have a single cotton farm that uses around 500,000 acre-feet [per year] . . . Actually they used a little less a couple of yearts ago, because in 1986 this particular cotton farm was paid $20 million not to grow cotton.

These top three water consuming crops -- grass, alfalfa, and cotton -- consume three times as much water as all the urban and industrial users in the state . . . three times more than all the homes, schools, industries, golf courses, parks, refineries, car washes, hotels, restaurants, mil;itary bases, and more. To use one acre-foot of water you have to flush your toilet about 65,000 times. We have a single cotton farm that uses around 500,000 acre-feet [per year] -- thirty two and one half billion flushes per year. Actually they used a little less a couple of years ago, because in 1986 this particular cotton farm was paid $20 million not to grow cotton. The crops you associate with California -- oranges, grapefruit, lettuce, tomatoes, broccoli, almonds, walnuts, olives, lemons, avocados, asparagus, grapes -- grapes, too, plus twelve dozen other varieties of fruits, vegetables, and nuts used just 17 percent of the state's agricultural water last year. In Arizona it's virtually the same. In Colorado, the big water consumer is alfalfa. It uses one out of every four gallons consumed in the state. What does it give back? $160 million in a $90 billion state economy.

Ah, but you say people have to wear cotton clothes. Humans are omnivores and eat cows and sheep, which eat alfalfa and grass. But where should these crops be grown? Where, in a true free market economy, would they be grown? We used to have a great cotton industry in the south until federal irrigation projects moved west. They used to grow a lot more rice in the south until federal irrigation moved much of the crop to California. Cows grow fat without much coaching on Illinois hay and corn. Why raise them in Colorado? Why not raise elk and bighorn sheep, which are more valuable.

Now what am I suggesting here? That the Bureau of Reclamation order its client farmers to grow this or not to grow that? But that's socialistic! Sure it is. But it's more socialistic to sell them hundred-dollar water for nine dollars and fifty cents, which is what we're doing in the Westlands Water District of California. Or to sell three-dollar per acre-foot water to rice farmers when the same amount cost me four hundred bucks. Consistency may be the hobgoblin of small minds, as Emerson said, but in this case I'd like to see more of it. If you get subsidized food from the government -- food stamps -- you can't use them to buy scotch. When I received a journalist's equivalent of food stamps -- a foundation grant -- I also received a two-page list of things I could and could not do with the money. But you can buy enormously subsidized federal water and do what you please with it. You can raise surplus crops, which depress commodity prices, and help speed your farmer brethren in other states toward bankruptcy, which means the government steps in with your tax money and tries to save them. And you can supplement your subsidized surface water by vandalizing a public resource -- nonrenewable groundwater -- and while you're at it, you might as well poison it with agricultural chemicals, too.

Water in North American west is governed by neither capitalism nor socialism. What we've done is combine the worst of capitalism with the worst of socialism. This was possible, perhaps even necessary, when the west was still young, its resources intact, its wilderness undefiled. But today it's creating the worst of possible worlds.

So what's in store for us?

In the immediate future, drought, . . . perhaps, for once, a really historic, apocalyptic drought. No one really understands drought cycles yet, but tree ring studies suggest that a big one is due. (In the 1700s, by the way, California went for as long as 40 years with much less precipitation than we call normal today. That may be one reason why the Spanish were so oddly willing to give up the state.) The west experienced a long, severe drought in the 1880s, and another one about 50 years later, and now we've come fifty more years. This drought, I predict -- if it really does become more severe -- will radically change the way we think about water in the American west. The

great drought of the late 19th century was largely responsible for creating the Bureau of Reclamation. The depression and great 1928 to 1935 drought launched us on a 40-year dam-building binge. This one could have an effect equally profound.

There's a funny interdependence, by the way, between Republicans, the economy, and droughts. The panic of 1893 followed years of Republican administration and coincided with a drought. The Great Depression followed nine years of Republican regimes and coincided with a worse drought. Now we have had eight years of Republican administration, we may have eight more, and my only question is what's going to be worse: the upcoming depression or the ongoing drought? There's a Democratic God in heaven, swilling Mead and marrying Republicans to depressions and droughts.

As bad as this drought may get, however, I'm not yet convinced we're going to turn the Klamath River into another Lake Mead, or that California will go out and annex Nevada to gain a right of way for the aqueduct that's going to connect the Columbia River to L. A. We're too broke, for one thing, and for another, it's too late. By the time we got a huge new waterworks completed, California's economy could be in ruins.

What I think you will see -- besides a lot of groundwater being pumped -- is a radical transformation of the old politics, the old alliances, that have long governed water politics in the west. In California, Los Angeles has always joined forces with San Joaquin Valley growers in its efforts to bring more water south. In a severe drought, with the growers hogging all that water, Los Angeles is going to ally itself with its arch-enemy, Northern California., to wrest some of it away. Los Angeles is going to want to rewrite the Appropriative Rights Doctrine and fine-tune every statute that inhibits transfers of water rights, and to do that it's going to need Northern California's votes.

So it's going to be the cities versus the farmers -- I can't see things turning out any other way. The environmentalists are going to side with the cities. Why? Partly because they live in Northern California, and an acre-foot used in Los Angeles means five more people who will settle there rather than up north. But mainly because any water that's sent to Los Angeles promotes much more economic growth -- with less environmental harm -- than if it's used by agriculture. All the foothill dams that blocked our vanishing salmon runs . . . all the wetlands acreage destroyed -- 93 percent of it, to be exact . . . the selenium and pesticides pouring into waterfowl refuges and the San Francisco Bay . . . the river-killing silt from farm and ranch runoff . . . all the riparian forests gone . . . you can't lay the blame for any of this at Los Angeles' door.

Now a drought can make people even more panicky than an oil crisis, and there's no telling what people in a state of panic will do. I concluded my book with the specter of water flowing all the way from British Columbia to the southwest, and I'm not entirely prepared to rule out that prospect. But as long as urban users have to reduce their consumption 75 percent to save the amount of water an 8 percent savings by agriculture would realize, the pressure will be on the farmers to give some of the water up. Events are conspiring against them so much anyway that they'll voluntarily give some of it up. Selling water may soon be the only way a lot of growers will be able to keep farming.

If the low-value crops that consume small oceans of water throughout the arid west shift back to the wetter climes, where they belong, we may actually have a water surplus on our hands in wetter years. If we do, then I hope we're finally mature enough to use it wisely. Let's not give it all to Los Angeles. Or Sacramento. Or Denver. Or Reno. Or Salt Lake. Let's store some as a hedge against potential scarcity. And then let's give some back to our poor rivers. Our nearly extinct wetlands. Our salmon. Our ducks. The things which -- though we do everything in the world to deny it -- really make our short lives full, rich, mysterious, and worthwhile.

Let's un-New Jerseyfy the west. Thank you for your support.

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