American WHITE WATER
the Journal of the American White-Water Affiliation

1869-1969
John Wesley Powell Centennial
First Descent of the Colorado

SPRING, 1969
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Above: Norm Holcombe and (below) John R. Sweet, Youghiogheny River, 1968. Photos by Bill Jones
The American Whitewater Executive Director
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P.O. Box 844
Temple, Tex. 76501

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Editor:
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Racing Editor:
Tom Wilson, P.O. Box 237, MIT Br. P.O. Cambridge, Mass. 02139
Business Manager:
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Circulation Manager:
George E. Larsen, P. O. Box 1584 San Bruno, Calif. 94066
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Cover: Photo by U.S. Department of the Interior
Dear Peter:

Locally we are concerned with the rehabilitation of the Coquitlam, which used to be a famous steelhead river and up to 10 years ago a canoeable 8-mile stretch within 15 minutes of the city.

The river has a dam for water supply, but used to have a sufficient run-off till July. This water company was once private until the government took over and also diverted excess water into another lake for "flood control". Several gravel and asphalt companies established themselves along the river and did raise hell with the river and an included park reserve.

The local Hunting & Fishing Club is fighting to rehabilitate the Coquitlam and requires all the support they can get. I wrote them a letter about the additional value the river had for canoeing.

Although the Coquitlam as a whole is no wilderness cruising stream, it has a wilderness characteristic and some tremendous white water for about five miles, when it becomes a float stream which leads to the Fraser River. In the upper part it is a heavy blocked class II or IV depending on the water level, then III and II. It is excellent for short afternoon trips, and for a training ground; it has great potential for a down-river or slalom race. The Chamber of Commerce and the Hunting & Fishing Club have shown interest in race sponsorship.

I would appreciate it if readers would send words of support to: Mr. Doug J. Michie, 3332 Mason Ave., Port Coquitlam, B.C. He is the outdoors editor of a local newspaper, a fisherman and canoeist.

The Port Coquitlam & Coquitlam District Hunting & Fishing Club is a fair-sized organization which I am sure would at any time return the favor in supporting U.S. river conservation projects. We need all the support now and more than ever!

Vern Rupp
724 Poplar Street
Coquitlam, B.C., Canada

Yours,

(Ed. Note: The identity of interest between boaters and fishermen far exceeds their occasional disagreements. Vern's request for aid deserves warm support.)

Dear Mr. Whitney:

The imaginative and interesting article by Jay Evans in the Autumn issue of American White Water on the possibility of constructing a White-water Park for canoe buffs had many good ideas, but stopped too short in pushing the theme to its logical late Twentieth-century fulfillment. If our sport follows the lead of skiing, the following will be the obvious result:

Picture the white-water parks of the future located in the midst of the West Virginia or Idaho mountains — "Seven Stoppers," "Sinking Gunwales," Heavenly Hydraulics," "Friendly Eddies," etc. — the mind runs amok at the possibilities. Each resort will be equipped with all of the needs of the future paddler in mind. The 300-room lodges will feature a complete array of activities and facilities for the après-canoe fans as well as the canoe bums who will eke out a living hanging around these pleasure palaces. Folk-singing around revolving fireplaces, swimming in the heated rapids that gurgle through the mezzanine, and even a ballroom for square dancing will be popular. A theatre will show continuous movies featuring the latest European slalom races. Several cocktail lounges will also be available to quench the thirsts of the
many guests and the memories of the older paddlers who can still recall the hardships of paddling in the good old days.

The main point of attraction in the lobby will be a bronze statue of Milo Duffek doing an upstream brace in a fountain of class IV water. Each room will have its own wet-suit dryer, electric knee massager, and a control knob for pre-taped, piped-in sounds of rapids which can be dialed anywhere from "Babbling Brook" to "Victoria Falls."

Vending Machines
Special shops located just to the side of the gigantic indoor kayak polo pool will be equipped with vending machines dispensing the latest formulas of polyester, epoxy, and poly-pupil resins to repair indiscretions in judgment committed by the guests. Shock cord, tape, and glass cloths in assorted thicknesses and lengths can be obtained from the shop's steward who will assist the canoeist in replacing the repaired boat under the several banks of infrared lamps to hasten curing. Teflon paddle splints will also be available for mending broken paddles and heavy-duty sewing machines (with or without seamstresses) can be rented for skirt stitching. The Boat Boutique, as it will no doubt be called, will also offer a complete line of gaudy clothes imprinted with the latest psychedelic patterns for those who would rather build boats than paddle. A variety of molds will be on hand for modest rental fees including the latest Peruvian C-3 mold. Custom-made kayak seats, knee braces, and helmets will be a specialty aimed at pleasing the most discriminating paddler.

Haute couture of course will be uppermost in the mind of the fashion-conscious paddler. The men will wear form-fitting wet suits smartly tailored to give that ever popular "Dartmouth" look and available in eye-arresting colors such as magenta, chartreuse, and a special color, au naturel. The distaff paddlers will be attired in wet-suits that terminate fetchingly ten inches above the knee and will plunge to an indiscreet distance above the navel. Crash helmets will no longer look like mixing bowls, but will be handsomely styled to hide their true purpose. The very thin, high-impact plastic will be covered with a stylish wig so that the canoeist can wear one and assault the stream with a seeming indifference to personal safety.

Choice of Rapids
Each lodge will feature several streams for the paddler to choose ranging in difficulty from class I to VI. First aid attendants well versed in mouth-to-mouth resuscitation will be on duty at strategic locations as safety will be of prime importance to the management. (Insurance policies may be obtained from the attractive canoe-bunnies in any of the cocktail lounges). An ever-alert river patrol will constantly cruise all of the streams. Their smartly colored decks of blaze orange will easily identify their canoes. Their prime function will be to yell at paddlers on class IV streams to get over on the class II run.

River canoeing will be so popular that reservations will have to be made at least three months in advance for the smartest lodges. Travel agencies will have several packages of "paddle now, pay later" plans from which to choose. The $25/day lodging, which includes shore lunches, but not breakfast or dinner, $20 canoe tow tickets, insurance, transportation, 2 tickets to a kayak water polo match, boat and life jacket rental, etc. will be included in packages popularly priced at from $1500-$3000 per three day weekend depending on class of accommodations and length of your bar bill. The prices do not include private lessons from Czechoslovakian instructors.

The possibilities are endless and the mind boggles at the prospects. As I sit here considering the future of white-water paddling, chugging my third Teacher's double on the rocks, and reading the classifieds, my hand reaches uncontrollably for the telephone to dial the number listed under "Learn to Sky-Dive — New Classes Now Opening." Bob Burrell
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Time to Renew!
1969-70 Dues Are $3.50
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A Powell Expedition ready to start at Green River Crossing, Wyo. This was Powell’s second, more leisurely journey in 1871: there are no photos of the pioneering first expedition.

100 Years Ago This Summer: Powell's Great Adventure

Just a hundred years ago, as most readers take up this issue of American White Water, one of the greatest feats of exploration in history was being accomplished. John Wesley Powell, the one-armed Major-Professor from Illinois, was leading a party of ten brave men down the unknown Colorado River, and was thus filling in the last great blank space in the map of the United States.

With a machine to warp time, namely the imagination, the white-water devotee can re-enact the days of the great summer of 1869, one by one: he starts at Green River Crossing, now Green River, Wyoming, on May 24, finds himself at Disaster Falls two weeks later, where the boat "No Name" is lost, but no men; reaches Split Mountain, June 25 — a month and a day after the start. He will repeatedly tip over and swim, repeatedly will inch the heavy boats down grinding portages, repeatedly lose oars, instruments, guns, food that was regarded at the start as essential.
Major John Wesley Powell with a Paiute Indian. A man of wide talents, Powell was perhaps most humanly great as an expert on, and sympathizer with, America's indigenous people.

He will learn to fear and hate the canyon walls when they are of granite — significant of sharp and frequent rapids — and to cheer the reappearance of limestone. He will see no man but his fellows for weeks on end. He will sleep wet and cold by driftwood fires, looking up at the jeweled stars, reflecting the miracle of having survived and of being the first to do what is being done by this little band. He will spend a whole precious day sawing new oars from driftwood, precious hours sifting and drying out musty flour.

On July 18 the Grand joins the Green; on July 23 Major Powell and his brother climb the cliffs to find pitchpines — their resin is needed to caulk the leaking boats — while the men down by the river are sawing out more oars. On July 23, they name the place Cataract Canyon, having come to more "difficult rapids and falls" than they had yet experienced. The canyon grows narrower, with virtually no landing place at the foot of the cliffs, which are 1300 feet high. August 1, they camp in Music Temple, and stay two days. On August 9, they give Marble Canyon its name.

On August 13, in a famous and gripping passage, Powell writes: "We are now ready to start on our way down the Great Unknown. Our boats, tied to a common stake, are chafing each other, as they are tossed by the fretful river. They ride high and buoyant, for their loads are lighter than we could desire. We have but a month's rations remaining. The flour has been resifted through the mosquito-net sieve; the spoiled bacon has been dried, and the worst of it boiled; the few pounds of dried apples have been spread in the..."
sun, and reshrunken to their normal bulk; the sugar has all melted, and gone on its way down the river; but we have a large sack of coffee. The lightening of the boats has this advantage; they will ride the waves better, and we shall have but little to carry when we make a portage." They are entering Grand Canyon.

On August 14, the river re-enters the granite. The canyon is narrower than ever. August 17, the last bacon is so spoiled it has to be thrown away. On August 21, "we run out of the granite!" But in only a week, they are back to the feared strata again, and camp at a place that "seems much worse than any we have yet met." It is Separation Rapids, and here, that evening the Howland brothers and Wiliam Dunn announce that they will go no farther, but will climb out and take their chances with the desert and the Indians. They persist, even when the Major computes their position with his sextant and proves that at most they are 100 miles from mapped territory and Mormon settlements.

August 27 — The Howlands urge the rest to abandon, and the Major has a bad night, reflecting on the chances: "I almost conclude to leave the river. But for years I have been contemplating this trip. To leave the exploration unfinished, to say that there is a part of the canyon which I cannot explore, having almost accomplished it, is more than I am willing to acknowledge, and I determine to go on."

August 28 — They leave one boat behind, give rifles and a shotgun to the three deserters, who help them lift the two remaining boats over a rock wall before launching for the necessary run, which is fear-inspiring, but is made in safety. That same day, they run Lava Falls, the most dreaded in the Colorado by modern river-runners; one boat capsizes but all are safe. The next day they are out of the Grand Canyon and on August 30 they meet first Indians, then Mormons. Six have persisted and survived: the Howlands and Dunn climb out of the canyon only to be murdered by Indians, at first hospitable, but wrought to frenzy by false tales of the massacre of squaws.

It is one of America's great adventures. In these degraded times, it is good to recall that simple greatness was once naturally there when needed, without dramatics or self-pity. Still, they had their cowards and cop-outs; there were even those who made excuses for them. The more it changes, the more it is the same.

The story will be re-told and in part re-experienced this summer in communities along the river. Martin Litton, a Sierra Club director, will re-run the parts of the river that are not dammed, in wooden dories that are vastly superior to Powell's deep-draught boat, and with vastly superior white-water experience. Boaters wishing to recapture the great experience are advised to sign on with one of the many commercial rafting guides that are licensed by the U.S. Park Service — it is still a forbidding river for the small-boater.
Kayakists Ray Warner, Dave Thompson and myself left our homes in Kalamazoo, Mich. May 13th of 1968 for the Wolf and Peshtigo Rivers. We made our first camp at Boulder Lake near Langlade, Wisconsin. Dave has a large camper-pick-up that was to be our home for a week. For a shuttle vehicle we had borrowed a Honda motorcycle. We warmed up on one of the easier stretches of the Wolf on Tuesday and Wednesday, drove the 50 miles over to the Peshtigo to run Section III as described in Andres Peekna's "Guide to White Water In The Wisconsin Area." After unloading our gear at the Farm Dam Ruins, Dave took the camper down to the take-out point at the
Dave padlocked the Honda to a tree at the take-out point. Highway "C" bridge.

After a short time Dave came flying back on the Honda in full wet suit. With rain-swollen clouds overhead we pushed off into the quiet pool of water just above the old dam.

This section of river in the spring has an average difficulty of IV and drops at an average rate of 40 feet per mile. There are six steep drops that require scouting. After a mile and three-quarters of rock-dodging you come to the first one. The second drop is within sight of the first and after scouting, all three of us proceeded singly without incident through both of them. These drops are short and steep and have one big roller near the bottom to get through. A half-mile down you come to Kussokavitch which precedes Five-foot Falls by a mere 80 yards. At this point Dave took out and portaged around both drops. I had some apprehensions about Five-foot Falls as I had spilled on it the year before and was unsuccessful in trying to roll-up. Rolling downstream can be difficult and in shallow water it is not very inviting to swing underneath to the other side. The challenge being there off we went. Going through the third drop and down through the falls didn't seem quite as difficult as it had the year before. Ray (formerly from Arkansas) made the run with his usual calm and fine dexterity.

I must say at this time that Ray has more natural ability in the kayak than any person I know. His calmness and deliberateness is a thing to marvel at.

With the falls behind us we hadn't far to go before we came to Horse Race. Horse Race is a narrow steep rapids 300 feet in length with a grade of IV even in low water. Dave and Ray decided to portage around although Ray had made a successful run two years before through the rapids. About the time I screwed up my courage to run the rapids, it really started to rain hard, so we waited long enough for the rain to subside somewhat, so that we could get pictures. After one large haystack at the top of the run it is relatively easy going until near the bottom you encounter a large rock that half the river flows over. Upon approaching this rock I slowed my kayak...
Dave Thompson (yes, his hair is white: he's an enthusiastic beginner at 57).

and began working to the right of it, and this was my undoing. Having lost forward momentum I thrust my paddle into a large hole on the right side and never reached solid water.

Over I went, the rest of the way upside down banging my trusty Buco crash helmet on the rocks until I reached quiet water where I could slip out. I had decided beforehand not to try to roll. After a run like that you can say is that there is always next year.

At this point Ray's boat was leaking badly from a long crack in its bottom, and he decided to hoof it out to the road with his boat and meet us back at the truck later. Dave and I continued down to the S curve, which is the first bend in the river after Horse Race Rapids. We both encountered some difficulty here. Dave banged into several rocks that turned him sideways and almost upset him near the top of the rapids, while I tipped and rolled in the middle and found myself headed upstream. (Ye gods, what a feeling to roll up headed the wrong way). After several fearful moments of being held in the roller wondering what to do next, I leaned the kayak downstream and got out of there. From then on the four-mile section called Roaring Rapids is a sheer delight. Flowing over granite rocks the river drops at a rate of 47 feet per mile. The rain was still coming down at the end of our run and if we were wet, our spirits were not. We travelled back to the Wolf River that evening and finished out our week kayaking and watching the Midwest Slalom races held on the 18th and 19th at Hansen's Rapids.

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If you travel west of St. Louis, you will often see signs beside highways that say you are on the Lewis and Clark Trail. While national and state committees have worked energetically to mark highways, the real Lewis and Clark trail has been disappearing under reservoirs and navigation channeling. Only in Montana is there a little of the wild Missouri River remaining, and of course the engineers want to impound that, too.

The upper Missouri is included as a study river in the Wild and Scenic Rivers Act, and the National Park Service has a halfway plan to preserve a little of it. The proposed Missouri Breaks National Riverway would preserve the Missouri from a point near Fort Benton to a point near Robinson Bridge. Missouri Breaks is a local name for the rugged landscape near the river, but most of the articles written about the river emphasize that the valley is essentially unchanged since Lewis and Clark described it in their journals. The Lewis and Clark expedition made a decision at the junction of Marias River and the Missouri River that probably added Washington, Oregon and Idaho to the United States. The explorers experienced many interesting incidents in this part of their trip, and the Lewis and Clark journals provide an exciting and valuable description of the original wilderness landscape.

The Park Service plan ought to be expanded to include all of the Missouri River between the Maroney Dam near Great Falls to the Fort Peck reservoir. And the riverway ought to be named "Lewis and Clark National Riverway," as the Park Service suggested in one of their earlier studies.
Canoeing Their Route

I told you about my family's first day on the Missouri River when we nearly drowned in the rapids near Maroney Dam. ("Bareback Canoe Riding," AWW, Summer 1968) I am glad we didn't drown, because the rest of our two-week canoe trip to the Robinson Bridge was a delightful cruise.

When Thomas Jefferson sent Lewis and Clark to explore the Missouri River, both men were ordered to record everything in daily journals. So from late May until mid-June, 1805, Lewis and Clark wrote everything about this 220-mile section of the Missouri River. They described the rocks, the animals, the date when particular flowers bloomed, the number of prickly pear thorns they removed from their feet each night.

David, Susan and myself read the original journals of Lewis and Clark as we paddled down the river. The landscape really does look almost the same as the explorers described it. Cattle have replaced buffalo, the large herds of elk and bighorned sheep are gone, and the grizzly bear and wolves are gone. But the rocks and vegetation are the same, and the valley still has an abundance of wildlife including waterfowl, song birds, small mammals, rattlesnakes and mule deer.

Between Eagle Creek and Arrow Creek there are spectacular cliffs and towers carved by erosion in white sandstone. Running in straight lines through the sandstone cliffs are dark walls formed by intrusion of liquid rock into fractures in the sandstone. "As we passed on it seemed as if those scenes of visionary enchantment would never have an end..." Lewis wrote in his journal when he saw these cliffs and walls.

A Family Trip

I know of no other river where a man with average canoeing ability can load the wife, kids and family dog into a canoe, and make a 200-mile cruise through a real wilderness landscape.

The first 2 1/2 miles downstream from Maroney Dam is strictly a white-water run for people and boats equipped to run large waves. There are rapids with large waves for the next several miles also, but after Belt Creek there are
always smooth passages where an open canoe can safely run.

We camped near Belt Creek after the tipover on our first day. In the evening I walked to the junction of Belt Creek and the river. This was where Lewis and Clark maintained a camp for a month while they portaged boats and equipment around the Great Falls of the Missouri. The explorers named it Portage Creek. It is still a beautiful, wild spot used as an undeveloped campground by scout groups. It would be good to change the name of the creek back to Portage Creek, and build a road that would make this a put-in site for canoe trips on the Lewis and Clark National Riverway.
The Music of the River

By Doris Edna Gray

(In the summer of 1967 Louise Davis and Lee Arnold, both members of the Society of Women Engineers, New York Appalachian Mountain Club and AWA, attended the Second International Conference of Women Engineers and Scientists in Cambridge, England. A consequence was the 1968 visit of Doris Gray, lecturer in biochemistry at the University of Hong Kong and Hong Kong's official representative to the Conference. She joined the AMC-NY Delaware training weekend and wrote of it afterwards for the society's newsletter.)

"Come to my country and visit our mountains and rivers," I was invited, one year ago, in the old land of Ireland. And so I came, and here at five o'clock in the afternoon of a July day I sat, in the prow of a fiberglass canoe, in glory, listening to the music of the Delaware River.

Away from the music of rivers for so many years, I had forgotten its impress, and it was with a sense of shock and of poignancy that the realization came that the basic forms of the river's sounds were as I had remembered them, unchanged by the passage of time or of locale. Although I had been brought up in an area which had its share of small rivers, I had never listened to rivers from the same strategic position in a canoe that I was to occupy this week-end. My listening-post had been in years gone by a riverbank, quietly sitting on a fallen tree or walking slowly with or against the current flow. It was borne in upon me this day, that on the river bank the balance of sound is heard to some
disadvantage and that to be in the choice position to hear the rising swell of music in white water, the cadences in and around eddies, and the epic sweep and surge of river tone, one must be in the center of things—to be on the periphery was to hear the nuances of tone, and light and shade of the basic forms, distorted.

Under the woods in the shadows our dark waters moved, but softly and silently into sunlight, a sunlight that glittered abrasively in the reflection from the river. I found this hardness disturbing, as I had all harshness in the Western world after the softness of the Asian idyl, and closed my eyes, the better to hear the language of the river. We moved, and the voices from the waters were raised, so that I opened my eyes to see converging currents swirl in lingering eddies, a fragment of current returned to dally while reflections on the water chattered and rippled in sweet converse with their stolid parents of the bank.

Above the white water we had chosen for our interlude that week-end, the Delaware was merry, sparkling and with no hint of the sedateness it might, for all I know, give way to further down, as rivers have a way of doing. There was a sprightliness, a spring-like quality in its flow. In the midst of the river's activity I could hear, for the first time, in the clear insistency of its voice, music different, richer and more sonorous with an indescribable unearthly quality that seemed to be mediated by other-world designs.

In a canoe without a keel, we are fixed in a machine superbly responsive to the moods of the river, and in the sweep of the current I was caught up in the mystery of the shaping of forces which produce, from Heaven knows where, a variety of sounds which were given visual credence on the river's surface. I learned that one can 'read' a river, as one reads a musical score, and although I was strictly an observer, or passenger, in this sense, I could feel the quick adjustment of the canoe following the interpretation of a small peculiarity in the water's surface, and applaud with silent gusto the ne-

To save those fleeting seconds, Bart Hauthaway has designed Old Town a moving, swinging slalom hull. Shallow ends and rocker bottom will turn on a dime. In leans, it's stable on beam ends. Molded-in seat, leg and adjustable foot braces make this kayak one you can feel close to. Real close.

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gotiating of a particularly difficult passage. It was an essay in art.

This holiday in the New World was the first stage in my 'leave,' my long absence from the curious ambivalences which are daily facts of life in the Far East — and I was finding relief in the feeling that one is on the same wave-length as his fellows, and no longer subject to the tortuous complicated mystery of maintaining human relationships with those foreign to our thinking. There was a clarity about it all, especially on the river, where all seemed in the same orbit of understanding. The dimensions, although not clearly drawn, were in some subtle sense felt, and this provided a delicious sense of fulfilment, of accomplishment without effort.

"Draw," cried my partner from the stern, or "lean into the current," as we made for the restful lingering quiet of an eddy, in whose shelter we watched, while some of our number plunged through the white water with a grace, an élan, that made me wonder why others failed and fell into the roaring, hissing stream. "I forgot to brace," said one paddler from the safety of the river bank and his upturned canoe. But from the safety of our eddy we had leisure to survey parts of our river, and so I sat in the bow listening to the music of the river and wondering how the dead tree, submerged and threatening to those who fail to 'read' its significance, came to be there. Normally one is filled with regret at the falling of a tree, thinking of the infinite complexity of growth that is now ended. But death being a name for beauty not in use, it came to me, in the eddy, that here was a transformation, a resurrection in which the tree becomes part of the river's surface and lives on in its capacity to change surface structure. Below the surface cross-sections of the branches lie, moss clinging to the bark in an intimacy which gives notice of the unity of life even in a stream.

On looking back at what I have written it seems I have said little of substance. But perhaps I have taken on a task that is impossible of solution, at least for me. To convey the sense of music and mystery which strikes me in my encounter with nature is perhaps beyond me, but the emotion it evokes is real indeed and I cannot apologize for my thematic development.

As scientists or engineers we are all concerned with nature's laws, either in a practical application of them, or in free imaginative speculation and of the resultant ethic which stems from their acceptance. However we turn, we are involved, and the paradox lies in the necessity for exhibiting a faith in natural laws for which there is no logical determinant. But I have strayed too far from the river and my theme and variations.

Back in my tent, with the moon high in the night sky I thought our collection of multi-coloured tents the friendliest village in the world, and the camp-site beside the pond with its insistent croaking of the frogs second to none. By some magic or other, by a trick of time or of the light, I seemed unable to dissociate fact from fancy, or fancy from theory, but this on reflection was the way it should be, in the living presence of the river.
The "stopper" wave has dumped one crew; another is running Palmerston Weir. Photos by Mike Clark.

Ireland's Gruelling Liffey Descent

By Mike Clark
Editor, "Canoeing" Magazine (Britain)

Ireland of the Welcomes — Ireland, with its great lakes, wild rivers and placid waters running through some of the most beautiful, breath-taking countryside in Europe, is a canoeist's paradise... Ireland is a land of water, water of all types to suit the novice or expert paddler. Go anywhere, you will find a river, a lake or miles of unspoiled seashore — Ireland is probably one of the finest canoeing countries in the world, yet one of the least-canoeed.

There is little written about the quality of the water and few guides to the many hundreds of rivers; as one Irish canoeist said, "You could not explore all the rivers in Ireland in a lifetime!"

From north to south there are the mighty Shannon — the longest river in the British Isles, dividing the country; the Blackwater, the Lee, the Barrow and the Slaney, all rivers of outstanding beauty that are only now seeing a growing number of canoeists.

Glide across the still waters, float lazily along in the current, dangle your feet over the side of the canoe, pass quietly through green pastures or deep valleys where the riverbanks are clad with thick fir forests. Race down the wild rapids, the steep falls, canoe the thundering, boiling water, adventure and excitement everywhere, thrill to riding the giant Atlantic surf. Cruise the smaller rivers, explore the creeks and isles of the lakes and you become...
How to Enter Liffey Race

This year's "International Liffey Descent" canoe race will be held on September 6, and full details can be obtained from the Irish Canoe Union, (Racing Officer) 58, Wynberg Park, Blackrock, Co. Dublin, Ireland. The British Open Long Distance Canoe Racing Championships will be held the week before on the River Tay in Scotland, and full details of this event can be obtained from J. M. Woolley, 25, Binswood Avenue, Leamington Spa, Warwickshire, England. For both events a small amount of finance is available to national teams competing.

Come and try your hand at Long Distance Canoe Racing . . .

a true pioneer, for it is doubtful if many such places have seen the passing of even one canoeist.

Racing is Growing

RACE the wild rapids — yes, canoeing is not just a pleasant pastime, but a competitive sport, an Olympic sport at that, which demands the highest degree of physical fitness, immense stamina, and much technical skill. As all good sports, competitive canoeing started in Britain just over a hundred years ago when a John MacGregor designed and built the first 'Rob Roy', a kayak intended for touring. MacGregor founded The Canoe Club — later to become the Royal Canoe Club — at Teddington on the River Thames and his canoe trips throughout Europe spread the seed of canoe sport. On the continent of Europe, canoe sport now attracts spectator crowds as big as any football or rugby final. Duisburg, a flat water sprint canoe racing center in Germany; Spittal, a rough water canoe slalom center in Austria; Sella, a long-distance canoe racing center in Spain; and now, fast becoming as famous as any of these names in the canoeing world — the Liffey, Ireland.

Sponsored by the bottlers of Coca-Cola in Dublin, the Liffey Descent Canoe Race is the most spectacular

Dams Are Opened

Long Distance Canoe Race in Ireland and undoubtedly one of the finest events in Western Europe. The course of 16½ miles starts at Celbridge in County Kildare, and finishes at Butt's Bridge in the heart of Dublin. The course combines almost every conceivable hazard — fierce rapids, treacherous weirs and sluices that have to be shot, fish passes, very difficult portages, a tidal section, plus numerous bridges that cause turbulent currents and many other obstacles. In serious flood conditions one year, when Junior and Women competitors were asked to withdraw from the race, not a single canoeist got down the course without a capsize!

Dams Are Opened

Water is guaranteed. Fifteen hours before the start, a dam way up-stream opens its sluice gates to fill the river. Just before the start, Lucan Dam a few miles down the course also opens its
A novel way of shooting Palmerston Weir — though it didn't work out!

gates, letting out tons of water to fill the lower part of the river. The current runs fast, the rapids thunder, the weirs build up gigantic "stoppers", 25 tons of water per second pour over the course: during the race over 30 million tons of water will spill down the Liffey!

Only minutes now, 10, 9, 8, 7, "Are you ready . . . Go!" The premier class, the International K2 open doubles are off, and another Liffey Descent is under way. Within a few minutes the pairs will be racing through the wild Celbridge Rapids only a quarter-mile from the start, two hundred yards of boiling, racing water, strewn with rocks and the boughs of trees sweeping low across the surface. Here there will be any number of capsizes . . . The leaders are through, but there's trouble in the main pack — a crew bails out and the kayak turns broadside across the rapids . . . No stopping now to miss this craft, straight over the top — a kayak damaged, two or three more crews out in the water, but the race goes on, in a few minutes all the other classes will be hammering down through the rapids.

Ordeal of the Weirs

Having passed the rapids, across the lake, portage the Leixlip Dam, under Leixlip Bridge and on to the weirs and fish shoots. Seven weirs, some to portage, most to shoot, but each presenting a real hazard to the canoeists. Anna Liffey Mills, Wren's Nest and Palmerston weirs are the big spectacles of the Descent. Tremendous Anna Liffey Mills, eight miles down the course, is the first of these three really frightening, fantastic "V" weirs with a drop of 20 feet! Two miles further on is the infamous Wren's Nest Weir, probably the most difficult hazard to shoot in the race, with a strange current below that will have most of even the best crews out in the water. Here the crowds gather and soon the lower part of the weir will be strewn with up-turned kayaks, swimming canoeists, paddles and buoyancy floating around in the eddies.

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American WHITE WATER
Below: British crew racing through wild Celbridge Rapids.

Anothc and tackle Palmerston Weir, another crowd puller, there is no respite for the competitors in this race! Once past Palmerston, the major obstacles have been overcome and it is paddler against paddler instead of the paddler against nature. However, compared to such races in Brit; Long Distance Racing — The water is still very tricky. Now onto the tideway, under seemingly endless bridges and at last the end is in sight — oh how these canoeists look forward to a refreshing "Coke" thing to eat and a hot shower...
RACING REPORT

By Jay Evans

It all started shortly after Hallowe'en when a surprise three-inch blanket of snow fell on northern New England. Nobody thought much about it at that time, but it was a portent of the future. We didn't see green grass again until mid-April. During the deep winter, snow continued to fall: it piled up to the eaves of log cabins. Knowledgeable white-water people rubbed their hands in glee. "What a great spring it will be, lots of white water," was the greeting heard on Main Street.

Little did we know how great!

Three weeks before the Eastern Kayak and Wildwater Championships were scheduled for the Mascoma River in New Hampshire the area was still locked in the icy grip of winter. With some forethought, Dartmouth students ventured out onto the icy edges of the dormant river and boldly strung wires — all the while standing on frozen rocks which would soon be buried under a solid five-feet of roaring water.

One local seer opined, "You can probably run the Mascoma Race this year unless you get a week of warm weather followed by rain." His prediction proved all too accurate.

Comes the Deluge

On Monday before the race the Mascoma ran higher than it had been for years. The undergraduates were delighted. Here was great white-water — right in their own back yard. On Tuesday the sun broke through and the temperature rose to the 70's. On Wednesday the Mascoma overflowed its banks for the first time in well over a decade. On Thursday, with the weather still unseasonably hot, a college crew went out to saw off bothersome limbs and trees on the wildwater course —
branches twelve feet up which had never been in the way of paddlers before. And then on Friday the rain began — 13 hours and 45 minutes of it — a steady downpour which lasted throughout the night.

Saturday of the race dawned cold (35 degrees) and wet.

Wildwater racing at best is not the safest of sports simply because the competitor is not always under surveillance. This is especially true at Mascoma where part of the three-mile course winds its way through a beautiful but uninhabited valley, just off Interstate 89. A capsize and bail-out in this valley still deep in snow — even with the support of other racers — was an open invitation to the perils of exposure.

It seemed to us that we had two options: either cancel the competition or move the race to a safer river where a boater in difficulty could be retrieved immediately. Since the racers had driven to this Championship from as far away as Washington, D.C., Pennsylvania, Canada, Illinois, and even California, it clearly left us with only one option.

Fortunately, New England is blessed with many good streams and the White River — only 20 minutes away — afforded an excellent three-mile wildwater course with a road running alongside it all the way. As it turned out the decision to switch to the White River was one of the easier ones to make during this memorable weekend.

Neither Snow, Nor Sleet . . .

The racers for the most part, were good-natured and understanding about the decision and, as it turned out, several suddenly became very thankful. As the rain first turned to sleet, then briefly to hail and finally to driving snow, several of the racers voluntarily left the river to warm their half-frozen hands and fingers in the shelter of nearby automobiles. One experienced racer capsized in a particularly rough stretch of rapids. He tried twice to roll up, bailed out, and within 5 minutes was in a car warming his hands over the heater. I'm glad he wasn't on the Mascoma — and so was he!

In spite of the incredibly adverse conditions, the Eastern Kayak Wild-

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water Championship race was completed and a new champion for 1969 was crowned.

During the festivities at the clubhouse on Saturday night a certain air of apprehension was discernible. The Eastern Kayak Slalom Championship course had been set on the Mascoma. Could it be run under these conditions? Should it be run?

The conditions were unique to the seven-year history of the race. Usually there are lots of eddies where a bailed-out boater can reach shore safely — but that is with the river flowing at 500 cubic feet per second. On the day of the race we had an unprecedented 3,500 c.f.s.! In addition, there was but one small take-out point at the end of the course before the river tumbled into the thundering 600-yard Excelsior Rapids. A boater — or swimmer — had just one chance to make it. And what lay at the foot of Excelsior? A vertical 15 foot dam.

Except for those pointing toward a spot on the 1969 U.S. Team, nobody was anxious to get into that water. Never before in the eastern part of the United States had a slalom been set in such cold water with such enormous power and so thin a margin of safety. It was not unlike asking a person to jump off a 70-meter ski hill who had never previously been off anything more than 20 meters — without adequate safety at the bottom.

Limit on Contestants
A consultation of race and ACA officials quickly brought a consensus:
of the 45 contestants who had qualified for the Eastern Championships only those who were former U.S. or Canadian team members and those who had thoroughly proven that they were expert heavy-water rollers should race. And even any one of these was welcome to withdraw from the competition without stigma if he chose. This quickly brought the field down to 11 who qualified, 9 of whom ultimately raced. Two, perhaps wisely, declined. This wiped out the entire C-2M class, the K-1W class and reduced the entries from 29 in K-1 to a mere 5. All of the remaining contestants were asked to line the river banks and man safety stations.

When the decisions were reached an audible sigh swept through the ranks of the anxious boaters. Although later, as the sun warmed up and the first runs were completed successfully, several of those left out were known to have said, "Too bad, I wish Jay had let me race. I coulda made it."

The unusual condition of the river was only one of the problems. The

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**Race Results**

**Eastern Wildwater Championships**  
*White River, N.H.*

**K-1W**

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Nutt</td>
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<tr>
<td>McKee</td>
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<tr>
<td>Binger</td>
<td>21.44</td>
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<tr>
<td>Southworth</td>
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**C-1**

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</thead>
<tbody>
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</tr>
<tr>
<td>Burton</td>
<td>20.06</td>
</tr>
<tr>
<td>Chase</td>
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**C-2**

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<td>Fossett and Fossett</td>
<td>20.20</td>
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<tr>
<td>Church and Bliss</td>
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</tr>
<tr>
<td>Holman and Feldman</td>
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**Eastern Kayak Slalom Championships**  
*Mascoma River, Lebanon, N.H.*

**K-1**

<table>
<thead>
<tr>
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<tr>
<td>Eric Evans</td>
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</tr>
<tr>
<td>David Nutt</td>
<td>350.1</td>
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<tr>
<td>Les Bechdel</td>
<td>404.0</td>
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**C-1**

<table>
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<tr>
<td>John Burton</td>
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**C-2**

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</thead>
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<tr>
<td>Hager and Holcombe</td>
<td>734.6</td>
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<tr>
<td>Heinzerling and Osborne</td>
<td>947.0</td>
</tr>
</tbody>
</table>

(Owing to severe water conditions the race was limited to the above competitors).
Mascoma course is criss-crossed by railroad bridges throughout its entire length. One bridge ran between gates 7 and 8. One side the river surged within 23 inches of the underpinnings of the bridge superstructure. On the other bank the clearance came to 32 inches. Clearly, the low bridge would be one of the major obstacles in the race. Thus, at the starting line, a metal tape measuring 23 inches was placed beside a boater. Could he clear it?

The race commenced, and as people held their breath, one brave boater after another cautiously threaded his way through the course. Their instructions were crystal clear: Take no chances — stay upright — but if you capsize you must roll back up, otherwise it could be a swift and cold swim to eternity.

The runs were not models of perfection that memorable day. The winner, for example, had over 30 points in penalties alone. But each racer who competed more than fulfilled the faith of the race committee. Each did a competent job on the toughest and most exacting slalom course this country has yet seen. Nine boats entered, nine boats finished both runs, no one capsized and the 1969 Eastern Champion in Kayak slalom was determined.

And so the seventh annual Mascoma Slalom became history.

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Recent events in New Mexico have underscored the importance of communication between white-water boaters around the country, and the importance of the role that AWA can play.

Cecil Carnes, a long time AWA member from Los Alamos, New Mexico, has been busily promoting white-water boating in the Santa Fe and Taos areas, where the Rio Grande River offers several excellent canyons with Class III to V water, particularly during periods of runoff. He has been publishing a newsletter, "The Rio Grande Gurgle," as a medium for the exchange of information between area boaters concerning planned trips, novice classes, and water conditions. He and his friends have caused a real upswing in canoe sales in dry New Mexico.

However, after having the "Gurgle" in publication for a few months, Cecil was confronted by a minor official in the New Mexico Parks Department with a threat of prosecution under a New Mexico law which provides that anyone holding or organizing a "marine parade", "regatta" or "race" on the waters of the state must apply about thirty days in advance and get a permit. Since Cecil was publishing the "Gurgle", he was the "organizer" of these unlawful events, and was threatened by the New Mexico Attorney General's office with civil or criminal action.

Everyone in the white-water boating fraternity in New Mexico was found to be properly indignant at having to do their white-water boating under the appellation of "marine parades and regattas". That may be what you call them at Dartmouth, Jay Evans, but in New Mexico and Texas we don't run none of them regattas! Battle lines were drawn and Cecil even hired an attorney to defend his right to run the rivers without applying for a permit thirty days in advance.

**AWA Plays a Role**

Peter Whitney and I joined the fight on the part of AWA, along with many others who were interested. The upshot of the whole mess was that the New Mexico Parks Department and Attorney General decided that informal gatherings of canoeists and kayakers to run white-water streams were not, after all, "marine parades or regattas", even if the time and place of the trip and an invitation to join it was published in "The Rio Grande Gurgle." No permits will be required for such activities in the future, and the "Gurgle" still spouts forth in New Mexico. Colorado and other boaters who want to get on the mailing list should contact Cecil Carnes, 130 Rover Boulevard, White Rock, Los Alamos, New Mexico. He also has mailout sheets of river logs for the best white-water runs on the New Mexico Rio Grande. You can also obtain these notes from me, along with notes on the Texas section of the Rio Grande.

This story had a happy ending, but it points up a problem that AWA members have run
into the past and will encounter more often in the future. With the proliferation of laws and people, and the increased popularity of all forms of canoeing, nearly every state has laws on the books that are similar in some respects to those of New Mexico. Some day you may meet at the river bank to put in for your favorite run, and find the Sheriff waiting to collar you if you cannot produce a permit. We all need to be aware of the particular laws of our state, and of the present interpretations of them by park and recreation officials. If there is any question of their being misinterpreted as those of New Mexico were, so as to restrict white-water boating under the AWA Safety Code, you should consider steps to educate the officials on the sport, and on the vital differences between waterskiing/motorboating and the sport of white-water paddling.

Parks Are a Problem

Similar problems are now looming on the horizon in National Parks, and particularly in Big Bend National Park, where many administrators feel that canoes and kayaks are inherently dangerous and have considered barring them from canyons. Most of these attitudes, if traced to the root, will be found to have originated in an early capsizing on the part of the administrator, or in some unfortunate accident in the park on the part of an inexperienced canoeist. If some dunker gets in trouble in the park and is injured or drowned, the first reaction of most of these folks is to close the canyon to all canoes and kayaks. All of us in AWA need to contribute to the education of park and recreation officials so that they will be able to distinguish between the qualifications of paddlers and not just lump us all in the same category with the poor fellow who blindly takes an open canoe on a river far beyond the range of his abilities.

In the New Mexico case, the real credit for victory goes to Cecil and the New Mexico paddlers, but AWA made its contribution. Through the Journal we hope to stimulate more communication between paddlers with respect to any problems like this that might arise in the future. Please call on your Editor, Executive Director and Board for help if you hit a snag. A flood of letters from potential tourists outside the state is always persuasive.

From Your Editor

Note that the time has come for 1969-70 dues renewals, and for your convenience, an envelope is enclosed in which to return your check for $3.50 (individuals) and $8.00 (affiliates). Do so promptly, and ease the tasks of your Circulation, Membership, and Treasury Chairmen.

The tremendous growth in the number of white-water clubs over the past decade is chronicled in our "AWA Affiliates" list, a standing feature of our Journal. The Affiliation started with five groups, two on the West Coast, two in the East, one in the Rockies. Only fourteen years later, we are approaching ninety affiliates.

The Affiliation can confidently take a good share of the credit for this growth, which is absolutely essential to the spread of skill-with-safety in our sport.

The $8.00 each affiliate pays for organization dues is small compared to the services received. To be able to count on thousands of individual memberships — that is the only way your organization can remain strong and secure.

— P. D. W.
Conservation
Comment

By Peter D. Whitney

A dazzling victory for conservation of natural rivers was won in California in May, when Governor Reagan turned thumbs down — at least for the present — on the huge, costly Dos Rios Dam project for the Middle Fork of the Eel River.

It was the first time a significant "no" had been registered on an important feature of the California State Water Plan, whose main purpose, however, was reaffirmed by the Governor — to divert Northern California rivers for the benefit of Southern California's urban masses.

The Governor's chief reason for turning down Dos Rios was that it would flood the beautiful and fertile little mountain paradise called Round Valley; as the valley is largely populated by Indians on land assured them by treaties and agreements, there were strong currents of sympathy on the side of conservation.

California Water Plan

Possibly more significant behind the scenes was the startling cost of the California Water Plan to date, and the realization that there just has to be a cheaper way to get water to Los Angeles than a string of artificial lakes and rivers 600 to 800 miles long, from which perhaps a quarter of the water would be lost by evaporation before being "consumed" in the swimming pools of Palm Desert.

Significant, too, was the fact that the dam would have ruined a fine run of steelhead and salmon, have flooded much good deer-hunting land, and substituted mud-shored deep-drawdown reservoirs for grassy hillsides.

The Corps of Engineers, who were to have built Dos Rios as a 730 ft. earth-fill monster, did not help their case when they listed among the "flood control benefits" for the project, those very lands in Round Valley that would lie beneath the gathered waters. Apparently one form of flood control is permanent flooding!

Opponents of Dos Rios pointed out that to impound that much water always creates a new flood risk, for the most murderous inundations in history have always come when the dams go out.

This is by no means a remote or academic possibility; one of California's worst disasters was the outbreak in the twenties, of one of Los Angeles's big Municipal Water District reservoirs in Ventura County. In that concrete dam break, which came without warning, water was thought to have worked around the concrete and softened the anchorage.

Similar recent disasters in France, Italy, and the Los Angeles suburb of Baldwin Hills, underline the threat. During the Northern California floods of 1964-65, the worst damage along the Klamath River came when a big dam spillway was threatening to give way, and the engineers opened the penstocks, creating a huge surge all the way down the stream.

The Future Battle

It remains for conservationists — in California but not only there, because the precedent is of world-wide significance — to fight the whole idea of vast water export plans of this kind. They are bad for the "donor" counties (in North Western California, ultimately, most of the arable river-bottom land would be permanently flooded for the benefit of the desert South). They are not good in the long run for the recipients, which become wholly dependent on a vulnerable resource for their whole way of life. I understand that ecologists are struck by the fact that no civilization wholly dependent on large-scale irrigation systems has survived.

The reasons why this is so are often complex, involving soil chemistry, the
disposition of fertilizer "tail water" and sewage, even climatic effects. Perhaps the worst effect, however, is the encouragement the water gives to real estate speculators to put small-lot subdivisions into sensitive environments. Today, in alkali deserts, you can see signs advertising future Feather River water. Speculators, undiscouraged by the city fathers, have invaded the Santa Monica Hills, where the "rock" strata crumble in one's hands. Cliffs overlooking the Coast Highway in Santa Monica slide down on motorists periodically — because home-owners, watering their lawns, soften the unstable soils.

And of course there is the pollution of the environment caused by automobile exhausts — an indirect consequence of bringing in the water, but not so remote that a plain man can't see it.

Conservation Notes
By Bill Bernt

The National Wild and Scenic Rivers Act of 1968 has spurred widespread interest in state scenic river bills. Several states have proposed measures to protect streams not included in Federal legislation.

Tennessee, which in April, 1968, passed the first state scenic rivers bill, is considering the addition of the Hatchie River to the Tennessee Scenic Rivers Act of 1968 as a Class I Scenic River. Almost all of the Tennessee section of the river, from Serles to the Mississippi River, is included in the amendment.

Tennessee Citizens for Wilderness Planning are attempting to add the Big South Fork and Clear Fork of the Cumberland River to the National Wild and Scenic Rivers Act. The two remote Class II and III (difficulty) streams, which flow through sheer 500-foot canyons, huge boulders, and sandy beaches, were included in early versions of the bill. Tennesseans are also concerned about the rumored TVA Devils Jump dam on the Cumberland near Charleston, affecting the Hiwassee, and the Normandy dam, which would back up the Duck River.

Arkansas Considers

The Arkansas General Assembly is considering scenic river legislation on five streams in the northern part of the state. All of the five streams, the Buffalo, the Kings, the Big Mulberry, the Eleven Point, and the Big Piney, have been targets of the dam-builders.

The bill provides for zoning for 300 yards from each stream bank. Landowners could receive compensation and a tax rebate on this land, but prior land use could be continued. It does not provide eminent domain. The bill also calls for two classes of streams, Class A, flowing through essentially remote areas, and Class B, flowing through agricultural areas.

After the Missouri Scenic Rivers Bill was killed in House committee in March, proponents did not push the identical Senate bill. Instead, they requested that the legislature appoint an interim committee composed of House members, Senators, and citizens at large, to study the problem and suggest legislation at the next session (1971).

Virginia is at Work

The General Assembly of the State of Virginia has authorized a five-part study to survey, evaluate, and select streams to be protected and recommend preservation measures for them. The first phase, conducted at the University of Virginia School of Architecture with the Commission of Outdoor Recreation, is the preparation of a stream selection system. Other phases deal with preservation systems. A tentative draft of the final report is to be submitted August 1, 1969, to the Commission's director, Elbert Cox.

At the national level, the Eleven Point in Missouri is being studied intensively to develop classification and management plans; recommendations are to be submitted by October, 1969. Other rivers being studied for inclusion in the national scenic rivers system include the Gasconade in Missouri, the Buffalo in Arkansas, the Pere Marquette in Michigan, the Clarion in Pennsylvania, and the Chatooga in Georgia.

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The Threat of California's Water Export Plan

By J. C. Fraser
Chief, Water Projects Branch
California Department of Fish & Game

The tremendous fish and wildlife resources of California's north coast will face the challenge of their lives in the next decade. Numerous water developments that are now in various stages of planning have the potential of destroying many of the fish, wildlife, and recreational values that are now supported by this resource-rich area of the Golden State. But we fervently hope and pray, and are diligently working to see that this does not happen.

The California Fish and Game Commission, which sets policy for the Department called for: expanded Federal studies of the fish and wildlife problems; investigation of alternatives to dams at or near the mouths of the Klamath and Eel River; the financing of fish and wildlife studies by the water project developer.

The principal reason for development of California's northwest rivers is to satisfy an export demand of an estimated 10 million acre-feet for future central and south state needs. If California's population continues to grow at the rates presently predicted by demographers the demand for this amount of water will occur sometime between the years 2000 and 2020.

Dos Rios Reservoir [was once] the prime candidate for initial major storage. Now, attention will probably be redirected to the Helena Dam on the Trinity or Yellow Jacket Reservoir (with a small Dos Rios or English Ridge Reservoir) on the Lower Eel River as the initial major storage component.

Then The Trinity

Development of the Trinity River (second export phase) would follow the Upper Eel projects. Helena Reservoir is emerging as the key storage project on the Trinity with additional dams at Burnt Ranch or Schneider's Bar and Eltapom sites. Water would be conveyed to the Sacramento River for delivery southward via either Clear Creek and Whiskeytown Reservoir or by a Westside Conveyance System to the Glenn Complex.

The Great Klamath

The third major export phase contemplates large storage on the Klamath River with delivery via the Trinity Conveyance system to the Sacramento River and thence southward. This phase involves possible dams at the Hamburg and Happy Camp sites and the huge 15 million acre-foot reservoir behind the Ah pah (or Humboldt) Dam site fifteen miles above the mouth of the Klamath River.

Fish and Wildlife Resources

The northwest water development area supports annual runs of 350,000 to 400,000 king salmon, 125,000 silver salmon and perhaps a million steelhead. The magnitude of these resources is comparable to those of the Columbia River. Over one-third of the State's deer population inhabits the area.

The north coast streams also make a major contribution to the commercial salmon catch in California and to a lesser extent in Oregon and Washington.

Some of the proposed water developments lend themselves to the conventional approaches to mitigation of the fish and wildlife losses but many of them, especially the larger projects on the Trinity, Klamath and lower Eel rivers pose some particularly difficult fish and wildlife problems.

High value of this water for export makes downstream river maintenance highly controversial. (Reduction of fish water releases would reduce the unit cost of water exported for use elsewhere.

It is probable there will be increased resistance to costs for maintenance of fish and wildlife resources.

With full contemplated development very little fishing water will be left on the north coast rivers.

Ah Pah Dam on the Klamath River
would eliminate all fishing for salmon and steelhead throughout the Trinity and Klamath basins (409 main river miles) except for fifteen miles immediately above the ocean. Helena Dam would eliminate salmon and steelhead fishing from over 40 miles of one of the nation's most beautiful fishing areas on the Trinity River.

River bottoms and flat lands, which are generally the most productive, will be inundated.

Total deer habitat loss is very large, i.e., Helena Reservoir would inundate 15,000 acres of deer winter range supporting 790,000 deer-days of use annually.

Costs will be extremely high on north coast projects because of size of resources and special problems. i.e., Fish hatchery for the main Trinity (Helena Reservoir) would cost 7 to 10 million dollars of constructed at today's prices.

Alternatives

There is need to stimulate greater consideration of alternatives to large dams if we are to maintain some of the north coast fish life and wildlife resources as we know them today.

Some of the alternatives which should receive such study include:

1. A coastal submarine aqueduct to carry water from low-dam diversions near the mouths of the rivers. The U.S. Bureau of Reclamation is beginning a one-year study of construction feasibility.

2. Sea water conversion. With development of breeder type nuclear plants, desalinization costs may soon be competitive with later phases of north coast water projects.

3. Water waste reclamation, i.e., S.F. Bay-Delta waste management program which might call for reclamation and re-use of waste waters from the Central Valleys and S.F. Bay areas.

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