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NATIONAL SAFETY CONGRESS **TRANSACTIONS**

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Papers Delivered in the

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Public Safety Sessions

IMPACT OF THE FEDERAL BOAT SAFETY ACT

By RADM AUSTIN C. WAGNER
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A recent article in a trade journal dealing with boat financing told about a recreational boat dealer who helped a prospective buyer select his family boat and arrange his credit. A few hours later, financing approved, the dealer hooked up the new rig to the customer's car, handed him the keys and wished him a "Happy vacation." "Wow," said the incredulous customer, "That was great." We can only hope that during the following vacation our incredulous customer did not become one of the nearly 1,500 people who die each year in recreational boating accidents; most of whom died because they just didn't know what kind of danger they might be getting into.

A classic example of this occurred late this summer on the Ohio River. A young father with ten other people on his boat was returning from a day's cruise. At eleven o'clock at night he came out of the cabin, took the helm from his eleven year old son, and suddenly turned directly in the path of a large tow of barges. In the resulting collision, seven of the eleven perished.

We will probably never know for sure exactly what happened, but it's possible that the young father did not know what lights to look out for, that he did not realize his vision might be impaired by night blindness, or even perhaps that there were the large black masses of barges moving silently on the rivers. The especially tragic part is that it could have so easily been avoided.

The Coast Guard is a Federal agency charged with the responsibility for boating safety. As a maritime rescue force, this has always been our traditional role, but unfortunately this has often been after the fact. Our rescue teams were the ones who had to go into already desperate situations and bring in the survivors, or more often victims, of boating accidents. Now with the recently enacted Boat Safety Act of 1971, which the President signed in August of this year, we can change our role and act before the fact in helping the boating public.

The most significant part of this new law is that the Coast Guard is now able to establish and enforce minimum safety standards for boats and associated equipment. Previously there had been, and still exist, industry standards promulgated on a voluntary basis, but these are limited in effectiveness, for there is no enforcement and only a small percentage of the annual production is covered.

Among the first standards the Coast Guard is working to develop in an effort to reduce accidental drowning is load capacity and safe powering. This will provide the boating consumer with the information he needs to determine how many people he can safely carry in his boat, how much additional gear he can have aboard and what size outboard motor will not be too large or too small for his craft. Many people are not aware that an underpowered boat which cannot be properly maneuvered can be as potentially hazardous as one which carries too much power for its size.

Another area we are working in is flotation in a swamped or damaged condition. Basically, what we will require is that a boat continue to float and provide maximum possible support in a submerged state for the passengers carried in a floating state.

These standards are being developed in regulation form, and we hope to be able to promulgate them in time to affect the 1973 model year boats. At the same time we plan to establish a requirement that approved lifesaving devices must be carried on all water

craft, not just motorboats, for our statistics show that almost half the annual fatalities occur in boats which are not now required under present laws to carry life preservers. This regulation will be effective prior to the start of the next general boating season.

We feel the need for basic standards is self-evident, but this need is continually being reinforced by reported accidents. Since the passage of the bill, an accident occurred in one of our Southern ports. This involved seven people in a small high powered outboard. When the boat quickly throttled back, loose water in a faulty flotation tank surged forward and caused the boat to literally dive like a submarine. Although other boats were in the area, only two of the seven survived, one of whom was the only person aboard wearing a lifesaving device.

Following our first standards, designed to "drown proof" a boat, we plan to look to reducing the risk from fire and explosion by keeping fuel in the fuel system and out of the bilges of a boat. We will also examine other sources of accidents to determine what additional standards might be required. These could include navigation lights, deck and hull fittings, and marine signals.

Another important provision of the Act requires manufacturers of boats and associated equipment covered by standards to maintain a listing of first purchasers and to notify them if a safety-related defect is found in the product. If the defect creates a substantial risk of personal injury to the public, the manufacturer is required to correct the defect at his sole expense. This is the first safety legislation which specifically spells out this important provision.

Both the standards and the defect notification provisions apply primarily to boats and equipment built after the passage of the Act. However, we estimate that with the normal turnover of boats and the large number constructed each year, within seven years over half the boats in use will be covered by these protections.

The Act also speaks to other areas of concern to the boating public. One provision, which we call the "Good Samaritan" clause, provides protection to someone giving assistance to a boat in trouble. Any person who gratuitously and in good faith renders assistance cannot be held liable for civil damages if he acts as an ordinary, reasonably prudent man would have acted under similar circumstances. Although the traditional law of the sea has always supported this position, I am sure that it will be reassuring to the assisting boatman to have this protection clearly spelled out in the statute.

In order to bring the boating safety message more directly to the public, the new law authorizes a Federal assistance program to the states to encourage them in the development of effective programs. The states are encouraged to increase their public education and law enforcement patrol efforts on a local level. We feel that this will greatly aid the safety program and we look forward to active participation on the part of the states, for there is much to be done.

In a recent survey conducted in a coastal area we found that only 20 per cent of boat operators had any prior safety training. This, in spite of considerable and significant efforts by the Coast Guard and the voluntary civilian organizations such as the Coast Guard Auxiliary, the Power Squadrons, the Red Cross and others concerned with boating safety education to encourage such training. If we cannot improve this unsatisfactory level of public awareness by any other means, we may have to look to some form of operator licensing to accomplish it. We are currently working with a private contractor to develop a self study program which will, hopefully, be an effective means to bring a basic safety message to a broad spectrum of the boating public. If it proves successful, we will make it available to the states to use as the basis for the issuance of a safety certificate or license. Whatever program we recommend will be designed to place a minimum burden on the public and will be uniform among the various states. Its purpose will be to insure that people who use the water for recreation are at least aware of some of the hazards they may face and how to cope with them if they occur. We fully realize that with 14 million boat operators there will be a terrific administrative backlog. But if we count previous experience as demonstrated ability and if we concentrate on delivering a basic message to

the new boaters, we feel that we can significantly improve our boating safety record. It certainly can't hurt.

I mentioned earlier that programs would be uniform among the states. The Act speaks directly to this subject and specifies that the Federal government has preempted the boating safety field. In simple terms, this means that after a set date no state can have a law setting a standard for a boat or requiring certain equipment to be carried that is not the same as the federal requirement, unless the state can show that it is necessary to meet a uniquely hazardous condition within the state. This means that an operator of a boat which meets Federal requirements can move freely among all the waters of the country without meeting conflicting laws in each jurisdiction. Except, of course, where he meets the exceptionally hazardous conditions, and I expect he would like to know about those.

To match the responsibilities we are placing on the manufacturers and the states to improve boating safety, we in the Coast Guard are increasing our own effort. In the spirit of acting *before* the fact we plan to actively implement a provision of the law which authorizes a Coast Guard boarding officer to require a boat in an unsafe condition to return to a safe mooring. The specific conditions which we deem to be unsafe will be spelled out in forthcoming regulations, but so far districts have been instructed to assume overloading and lack of required equipment as prima facie evidence of unsafe use. In a short two week period, from the middle of August to the beginning of September, over 200 boat users were terminated. There was only one complaint out of the entire 200.

We are also expanding and increasing the activities of the Coast Guard Auxiliary. This group of dedicated civilian boatmen have been a great assistance to us on the Federal waters. During this year they will have given boating safety instruction to almost a quarter of a million people and conducted safety inspections of almost that many boats. Using their own facilities, Auxiliarists will have conducted 27,000 safety patrols, assisted 13,000 people, and actually saved 420 lives; all of this with minimal support and guidance of the Coast Guard. Under the new law, at the specific request of a state their services can be made available on waters wholly within the boundaries of a state. This should give a significant boost to state boating safety programs.

Taken all together, the provisions of the Boat Safety Act of 1971 are a giant step forward in protecting the boating public. Eventually, it will insure that a prospective boating enthusiast can purchase a boat with the confidence that it is basically safe, that the manufacturer had to build it properly to specific safety standards, that if there is a safety related defect it will be corrected, and the enthusiast himself will have been better educated, even if this education will be mandatory. Our "incredulous customer" may still be provided with good wishes for a fun vacation before he sets out, but he will be far better prepared not to inadvertently bring tragedy to himself and his family.

We do not mean to use our new authority to take the fun out of boating. Our waters are a wonderful place for recreation and we encourage their full use. But they are certainly not a place where ignorance is bliss and for someone who does not understand what can go wrong. We desire it not to be a place where a fun filled day is turned into tragedy suddenly and without warning.

We mean to extend our full efforts to seeing that our friend still says "Wow, that was great!" when his boat goes back in the garage at the end of a happy boating day.

NATIONAL WATER SAFETY TEST

By ROBERT F. BURNSIDE
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The American National Red Cross National Water Safety Test was developed after much deliberation and is based on the success of previous tests of this type. We were able to secure the volunteer services of Pat Paulsen and Bud Wilkinson, and the half-hour program was filmed at Cypress Gardens, Fla.

The test is a visual examination of an audience's knowledge of what to do in a water accident. The film presents Paulsen in a number of water accident situations. Each incident is followed by three possible courses of corrective action. Persons in the audience then select the response they believe to be the best.

Mr. Wilkinson, a special consultant to President Richard M. Nixon, acts as studio host and explains each correct answer.

It was prearranged with the Public Broadcasting Service that this test would be shown over 200 of its member stations before July 1, 1971. After that date the test, on film, was made available for use by Red Cross chapters on local TV stations and for other audiences.

The Red Cross feels that by watching and taking this test, viewers will become alert to the dangers inherent in water activities, and with this knowledge water accidents and fatalities can be reduced.

FALLS IN PUBLIC PLACES

By A. P. ISKRANT
Chairman, Public Safety Falls Committee, National Center for Health Services, Research, and Development, Rockville, Md.

Over five million of the approximately 20,000 annual deaths from falls and over four million of the 12 million injuries occur in public places. Of the deaths, the largest proportion occurs in resident institutions, followed by street or highway, public buildings, and places for recreation or sport. Of the injuries, the leading places are street or highway, school property, places of recreation and resident institutions. Again we see that old age is associated with the deaths and youth with the non-fatal injuries and the place of occurrence reflects that association. In the younger age-groups, the male is more likely to be injured and killed. In the older age-group, the female has the highest mortality rate, especially in resident institutions.

According to the Public Health Service, the most frequent causes of injuries from falls are "Jungle-Jim monkey bars," stairs and steps, slides and other persons. Stairs and steps are most frequent in resident institutions and other public buildings. In recreational areas slides, swings, bicycles, roller skates, and Jungle-Jim monkey bars are mentioned most frequently. On the street or highway the most common cause is the bicycle. In a previous study of falls in elderly persons conducted by the author (in a northeast city), slipping on ice or snow was the leading cause, with tripping second and steps the third most frequent cause. It is estimated that about 200,000 injuries from slipping on ice or snow occur annually.

What, then, do we know about falls that would help us in establishing programs of prevention? We know that deaths become an increasing problem with age, especially in resident institutions, on the streets and highways, and in public buildings. We know that slips on snow or ice, especially in areas of alternate thawing and freezing, are a common cause of death and serious injury. Cleated or slip-proof boots or overshoes would seem to suggest themselves. The resident institution with its high injury rate and frightening death rate would seem to be amenable to organized fall prevention programs. Michael Oliva presented a program for extended-care facilities and I recommended it to the Home Safety group and to local safety councils.

The approximate one million non-motor vehicle bicycle injuries, especially to male youngsters, would seem to warrant more attention. Programs emphasizing the dangers of riding double, the need for bicycle pathways, and the like should be included in accident prevention programs. The role of alcohol in other than highway accidents should be emphasized. Injuries on school premises, especially in gyms and playgrounds, should certainly be emphasized in programs directed at school aged persons.

Unfortunately, the epidemiologic studies into fall causations initiated in the PHS Accident Prevention Program have not been concluded. From scattered studies of falls, we found that clues to causation are frequently obscure and difficult to determine. General programs of prevention are difficult, and specific programs against causes would seem to be indicated. These specific programs can then be incorporated into broad accident prevention programs.

In the earlier epidemiologic studies into falls it became apparent that fractures from falls appeared to be positively associated with bone fragility, especially in elderly white females. Later studies showed this relationship extended to fractures from causes other than falls. In a study in Ford Hospital it was shown that the fracture rate (for women) was twice as high in each age group in women with osteoporosis as in those with greater density, especially fractures of the radius, femur, wrist, and ankle. The association was highest in fractures received in falls, especially falls on the same level. It was estimated that elimination of osteoporosis would prevent an estimated 350,000 fractures in women 45 years of age or older. A later study at Kaiser Foundation Hospital also showed an excess of fractures in men and women with low mineral at the distal radius. The excess was greatest in whites but also existed in black and yellow persons. It has been hoped that this research project would continue, to evaluate the effectiveness of preventive therapy in reducing the subsequent incidence of fractures in the treated group but, unfortunately, funding was discontinued prematurely.

PUBLIC AND RECREATION SAFETY

By JACK B. HOBBS
Tort Claims Officer, National Capital Parks, National Park Service Department of The Interior, Washington, D.C.

In the field of public and recreation safety, which is so often neglected due to budget problems, we find large and small parks, recreation fields, playgrounds, campgrounds, horse trails, hiking trails, bicycle paths, beaches, water activities areas, rock climbing areas, etc. These recreation areas, found everywhere in the United States, are used annually by over 200 million persons. They are an investment in the future of our country. Practically all are under the jurisdiction of city, county, state, or Federal governments, all of whom have problems with their budgets.

When we drive past a large well kept recreation area or a well equipped playground and hear the shouts of encouragement to the participants, or the squealings of youngsters on see-saws and swings, or note well dressed adults sitting on park benches in beautifully landscaped city parks, we may fail to see the problems of safety defects that may be met or unpleasant incidents that may be experienced by the persons using these public facilities. Some of these people are old and infirm, some are blind or crippled, others are too young to take care of themselves.

What are some of the unsafe conditions that are almost always found in these recreation areas—unsafe conditions or hazards that might affect or change the mood and welfare of unsuspecting people, both young and old, who have come to these areas to be away from excitement or boredom?

Slips and falls, stumbling, and losing balance constitute the greatest sources of injuries to persons in recreation areas. Usually these incidents occur along walkways, steps, or stairs, but they may occur anywhere in these areas—in museums, buildings, on or around statues or memorials. These incidents involve uneven walks, broken concrete, slippery surfaces, debris on sidewalks, uneven or broken steps and stairs, or large rocks in the outlying parks. Others may involve using paths for short-cutting, using what appears to be a public path, and making paths not intended, but a convenience to save a few steps.

Paths and sidewalks in parks are used by millions of persons daily, and it is physically unrealistic to maintain miles of sidewalks free from cracks, depressions, litter, stones, or acorns, but year in and year out most stumbles, slips, and falls occur along the walkways. Acorns drop, people strew litter, roots grow under walks and push the surface upward, but trees and people are a part of the park scene and we cannot get along without them. Park benches deteriorate, splinters develop, a slat is broken, and people get hurt or damage their clothing.

Steps to and from buildings, museums, memorials, and other attractions, may be broken or unsteady. Handrails may be either missing or unsafe and cause the user to lose his balance.

Children often fall from bicycles when the bike runs over debris or stones flung by unknown persons. Other hazards develop when the sidewalk surface has been covered with snow or ice that was not removed, or the walkway was not closed to public use.

In museums, people stumble, trip, or fall over runners that have curled up at the edges, or when the color pattern of the runners blend so as to obscure steps. Also, lighting in buildings may cause confusion and missteps. Visitors may step backward when taking snap shots and fall over a step they overlooked.

Visitors of all ages, from two to ninety years, are hurt while climbing over rocks in outlying parks. Others are injured when they become ill, such as from fainting, sustaining seizures, or overexertion. Many are hurt while engaged in sports in the recreation fields.

Most of the hazards or unsafe conditions could be eliminated by a vigorous policy of close and regular inspections and, importantly, closely following up with remedial measures. These inspections should be made by the employee maintaining the areas, with effective supervision by their supervisors. The followup, which is often neglected, is to ensure that reported hazards have been eliminated.

We cannot overlook that many, if not practically all, of the incidents resulting in injury to park visitors are the direct result of inattention on the part of the visitor. In this we are aware that when a visitor enters the park he rarely thinks of danger or safety. He is usually of the belief that the park has been made safe for him before he arrives. Often the visitor is looking elsewhere, not where he is walking. A child cannot see unsafe conditions, and it is necessary that the park management see the hazards for him and make the area safe for him.

In addition, many persons roam about parks and recreation areas. In ambling about a visitor may stumble into a patch of poison ivy or poison oak. An effective inspection would reveal the presence of such hazards. Additionally, in these days we find hoodlums whose sole mission in the park areas is to promote trouble. In such instances, there is no substitute for police patrols and inspections.

ALL TERRAIN VEHICLES

By CHARLES P. LEACH, JR.
Executive Secretary, National All Terrain Vehicle Assn., New Bethlehem, Pa.

The all terrain vehicle market is divided into three segments: recreation, commercial, and utility. Obviously, the largest segment, if the market develops to the levels which have been forecast, will be the recreational segment.

The majority of these vehicles are of the six wheel variety which will travel over virtually any surface—water, rocks, sand, marsh, snow—and can be used in hunting, fishing, camping, and other recreational pursuits.

These vehicles will climb a 45 degree slope, move at 25 to 35 miles an hour over a plowed field, turn on a dime, ford a river, negotiate a swamp, and run over snow. They are lightweight but will carry two full sized men plus more than 100 pounds of baggage. The all terrain vehicle is, in short, the year-round sportsman's delight.

Technically, the keys to the all terrain vehicle are the light-weight bodies, normally of A.B.S. plastics or fiber glass, and the low-pressure, high-flotation tires. These tires have only one to two pounds of pressure per square inch and have a tread so soft that the vehicle can run over a child with little danger of injury. The tires also serve as the suspension system for the ATV so that even when running over railroad ties there is little jolting. They serve as buoyancy tanks and propulsion system when the vehicle is in water.

Because of the simplicity of design and the availability of components, it is only natural that many companies have begun manufacturing all terrain vehicles. There are currently 12 companies manufacturing 500 units or more per annum, four at rates of over 2,000 units per annum. A recent *Field and Stream* article listed 43 firms currently manufacturing, and we know of more than 50 companies who are planning to introduce an ATV within the next twelve months.

The all terrain vehicle was developed in the late '50's as transportation for the logging industry. It wasn't until the early '60's that the "Jiger," as the unit was called, was known outside of the area in which it was developed. There can be little question that the all terrain vehicle will take its place shortly beside snowmobiles and boats as one of the nation's major recreational vehicles.

The projection of an annual sales rate of 97,000 all terrain vehicles by 1975 has been a decisive factor in the entry of large corpora-

tions into the all terrain vehicle market. Rapid development of this new market has sparked vigorous competition, with accompanying requirements for adequate capital to support intensive research and development coupled with expert design and engineering know-how. This challenging situation, along with the potential rewards, has brought a number of major U.S. Corporations such as Allis-Chalmers, Sperry Rand, Lockheed Aircraft, Borg-Warner, W. R. Grace and Co., to name a few, to seek diversification into the field.

There are two different design concepts for ATV's, and they involve use of a full steel frame inside a plastic body or fiberglass unibody construction. The power plant is a small light weight 2-cycle engine, normally about 20 horsepower. The engine drives a transmission through a drive and driven torque converter system. The transmission is really two transmissions with one common input shaft. Power to each side of the vehicle is controlled separately through control levers, or "sticks" as they are called in the industry. Power is applied to all six wheels through a series of chains and sprockets.

As demand and volumes and productive capacity increase the market will be fragmented. The special requirements of regions and function will bring about a much wider range of models and special equipment. Lower cost units, more deluxe models which will carry heavier loads, more reliable units, higher horsepower engines, quieter engines, pollution free engines, more sophisticated transmissions, higher horsepower transmissions, new and more durable body materials—t..ese and many others will be the requirements for ATV's of the future. Those companies with the engineering staffs who are capable of searching out, designing, and perfecting a new generation of ATV's will be the ones who will be able to successfully compete in the market place.

As a new and struggling industry we naturally face many problems. How do we effectively promote our products while we are still relatively unknown? What image are we creating, with the public? Where can these units be operated? Will legislation restrict the operation of ATV's/? There is also a total lack of reliable statistical information.

There is nothing quite like the thrill of being in an infant industry. For every fond hope there can be a dreadful worry to offset it. Now I know what it must have been like to be in on the ground floor of motorcycles, camper trailers, snowmobiles, or perhaps even a Henry Ford.

ENVIRONMENTAL CONSIDERATIONS—STANDARDS FOR USE AREAS

By PAUL SWAIN
Public Relations Manager, Ski-Doo Division,
Bombardier Limited, Montreal, Canada

In discussing environmental considerations for off-road vehicles, especially concerning standards for use areas, we must first emphasize that our comments are based primarily on snowmobile use areas. Our company, Bombardier Limited, is the world's largest maker of snowmobiles, so it is in that realm of usage that our efforts have been centered.

Snowmobile usage has soared tremendously in the last few years, with the result that problems of where to use snowmobiles, and how to use them, have caused much concern. Bombardier's Ski-Doo Division is involved in studies and developments in use areas and trails for snowmobiles to determine the needs of snowmobilers in relation to recreationists, outdoorsmen, conservationists, and the overall environment.

Our studies and those of other organizations already show that there is need for investment in additional and improved recreational facilities for snowmobilers. We have found that where there are well-developed, well-maintained snowmobile trails, safe and correct environmental use of the machines results because of the controls possible in trail areas.

While the information we will discuss is based on snowmobile trail studies, it can be generally said that, with additional costs for more complete ground clearing, leveling, and maintenance, trails can be adapted for year-round use of other recreational vehicles such as ATVs, minibikes, etc. Just as with snowmobiling, trails can encourage safer, better use of these vehicles, too.

So with that in mind, we will present some of the determinations of our Bombardier snowmobile use area studies—which, incidentally, are continuing on an even greater degree this winter with a massive trail maintenance program being carried out as part of a new Bombardier Snoplan to foster safer, more considerate use of the environment by snowmobilers.

During the winter of 1971, we conducted a qualitative sampling of 50 snowmobile use areas throughout the North American snowbelt. Three outdoor writers with snowmobiling experience were selected to do the research, photograph the areas, talk with snowmobile club members and officers, park and recreation personnel, resort owners, snowmobile dealers, and others involved in trails. They also talked with business people in trail areas to gauge economic impact, and confirmed the fact that snowmobile use areas are definite financial boons to communities. Numerous instances were recorded in which communities formerly shut down in winter could point to snowmobiling and trail area development as sources of new profits for service stations, restaurants, motels, and other businesses.

Included in our study were nine state and six national forest land areas, as well as five areas developed by cities or townships. Fourteen trail networks visited were developed by snowmobile clubs; 11 were privately run enterprises. Two areas of corporation-owned land open to the public were surveyed, as were three golf courses. Some systems ran rental operations in conjunction with the trails. Similar to ski areas, some trails were for expert snowmobilers, some for beginners.

We undertook the snowmobile use area study in quest of ways to provide safer snowmobiling, to develop environmental safeguards, and to encourage development of more places for snowmobilers to use their machines under those conditions. We felt that with more information we could help bring about all of these factors.

We have been cooperating closely with the National Safety Council in the United States

and with the Canada Safety Council for several years now, and their investigations have shown that a large number of snowmobile-related fatalities occur on roads and highways. Snowmobiles, while they are motor vehicles, are designed for off-road use and should not be operated on the road.

In most states and provinces, it is against the law to operate snowmobiles on roads. Nevertheless, people are driving their sleds on roadways. Last winter, for example, of the 51 snowmobilers who lost their lives in the province of Quebec, 43 of these deaths occurred on roadways. Six people drowned in lakes early or late in the season when the ice was not suitable for snowmobiling. The remaining two drivers were killed when their machines struck hidden or partially obscured objects. Both drivers were unfamiliar with the terrain over which they were riding.

Why do people disregard the facts and continue to operate snowmobiles in dangerous situations? We feel it is largely because there are not enough suitably designed use areas available for the snowmobiling public.

Safety problems, therefore, arise from irresponsible operation in the wrong locale and are not inherent in the machines themselves. Many of these accidents, injuries, and fatalities can be eliminated through the development of well-designed trail facilities which put machine operators in a controlled use situation and thus foster safe enjoyment of this family sport.

Any environmental problems that exist also can be controlled with the development of trail areas designed with environmental safeguards in mind. Trails can and should be routed so that the noise of the machines will not bother local residents. They should be constructed away from areas where wildlife winters and where plant life could be affected. Use areas should be developed so they blend naturally with the terrain.

What are some specifics of snowmobile use area development? Let's take a look at what our study uncovered:

The first concern to any use area, of course, is financing. How much will it cost to develop snowmobile trails? In most cases studied, the development of the trail system itself was very inexpensive. A majority of successful trail systems utilized some type of trails already in existence, such as old logging roads, unplowed or unused highways, abandoned railroad rights of way, bridle paths, hiking trails. Over 80 per cent of the use areas sampled relied heavily upon old logging roads which created a good natural trail system that took on a spider web effect.

If already existing trails or roads of one type or another are used without the construction of any new trails, development costs will be minimal. Almost every trail system that was built on already existing trails did not even list a development cost figure in its books. In most cases, volunteer workers using chain saws, etc., to clear brush and stumps from the trail needed only two or three days to prepare an area.

The Bombardier study shows that the other cost factors to consider in the development of the trails involved the building of bridges over land or water hazards, the clearing of new or connecting trails, and the erection of barriers around dangerous areas or areas where snowmobiles should not be operated. Labor costs for clearing the trails and preparing them for snowmobiling, and the cost of clearing equipment, were provided on a volunteer basis in the majority of instances. In much of the snowbelt there still remain thousands of miles of trails that with a little effort can be made ideal for snowmobile use. Some funds will have to be spent on building access trails and linking together available use areas. In the future there may be some investment necessary for equipment to develop trails from scratch, but most locales already have such equipment available. (Remember that at this point we are not talking about maintenance, signs, shelters, or associated facilities.)

From the areas that kept an accurate record of the cost of snowmobile trail development, we have determined that for each mile of snowmobile trail constructed the cost ranges between $100 and $150 per mile, depending on the type of terrain and equipment and amount of manpower required.

It should be noted that year-round use of trails requires a much smoother, better trail than one used just for snowmobiling, because in warm weather there is no snow covering

and anything on the trail is there to be crossed. Development costs for multi-use trails could be as much as two to three times greater, depending upon conditions, in the original preparation—or in further costs involved in adapting an existing snowmobile trail to year-round purposes, according to estimates we have received.

The report covers a few new trail systems which were developed with the help of landscape architects, environmental experts, snowmobile experts, and part supervisors. These individuals were able to design interesting trail systems using special maps. These people would also be able to give advice when already existing trails need to be altered to make them acceptable for snowmobile use because of safety or environmental considerations. Most of these people, especially if they were snowmobilers themselves, volunteered their time.

These are the types of trails we found available:

1. Systems on public land financed by snowmobile registration fees. Many enlightened park, forest, and other government people have taken definite steps to develop the public land under their jurisdiction.

2. Systems on private or public lands informally developed by snowmobile clubs.

3. Networks on the property of large corporations, such as paper companies or land developers.

4. Regulated areas set up by local businessmen on private land with use fees and/or rental machines.

5. Systems on private land for the use of patrons of a lodge, hotel, or resort. These last two types are the most tightly controlled of all use areas.

There also is increasing evidence of cooperative efforts among various government and private bodies to develop snowmobile facilities for the joint recreational and economic benefits of an area.

We found that a minimum depth of three inches of snow is recommended for snowmobile operation. Trails should be designed with a purpose in mind, showing points of scenic or historical interest. The topography should be varied to keep the rider interested and on the trail. The most popular trails include variety in terrain, speed, and degree of difficulty. Scenic lookouts give a purpose to snowmobile fun, too.

Cooperation among park, forest, and other people can be especially productive in the overall financial development of a community or unified area. An example is the Snowmobile Program conceived by the Douglas County (Wisconsin) Overall Economic Development Planning Committee and the Douglas County Forestry Department, a plan which involves cooperation of city and county and private enterprise, with Superior, Wis., the focal point.

The area has forests and points of interest which have the potential to support a substantial program of recreational developments that will benefit Douglas County in dollars for gas, food, lodging, and related services for snowmobilers who will come into the area to use the facilities. The area includes Superior, Wis., Duluth, Minn., and other communities with a total of 176,000 people. Many thousands more are not far away, looking for good recreation spots.

The Douglas County program is based on multiple usage, for summer and winter, with various trails in summer devoted to such recreational pursuits as trailbikes, ATV's, bicycles, and hiking.

Winter trails should not conflict with other winter sports like cross-country skiing or snowshoeing. Not only is this unsafe, it also infringes on the rights of others. We also advocate the sensible zoning of areas where no vehicular traffic should be permitted, winter or summer. These wilderness areas should be respected by all those concerned.

Our study indicates that trails should be at least 10 feet wide and preferably should be one way. We found that even some very wide trails had dangerous spots at sharp curves if they ran in both directions. To eliminate possible head-on collisions, one-way trails should be the rule. If facilities limitations or other reasons make two-way trails necessary, they should be at least 16 feet wide with a median in the center to divide the trail.

Trail widths may have to vary in some cases because of the terrain, but situations where a snowmobile must attempt to squeeze between two trees or other fixed objects

should be avoided. In such cases, trees or other obstacles should be removed. Also, if trails are 10 feet wide, trail maintenance will become easier since efficient maintenance vehicles are at least eight feet wide.

Hazardous trees (dead tops and leaners) 20 to 30 feet off the trail also should be removed to eliminate repeated trips to reopen the trail because of fallen trees and branches after heavy wind or snow.

For year-round trails, grade any portions that are open to vehicle traffic in summer and fall. Maintaining a smooth dirt base provides safer summer trail riding and eliminates ruts and holes that allow snow moguls and the washboard effect to build up during winter snowmobiling.

While the trail systems we visited varied in length from only four miles to 500 miles, the average suggested trail length is 50 miles. The most popular system designed was the spider web, which in most cases fit perfectly into the pattern of old logging roads which were utilized for the trails. Small looped trails within a larger system provided suitable length for all types of riders. For instance, in a system where the longest trail is 50 miles, shorter trails of one, five, ten, and 25 miles within the longest trail are ideal. The important thing here is to make certain a snowmobiler can easily return to his original starting point The best areas had a sign-in, sign-out system set up at the start of all trails in order to keep track of how many people are on the trail and to be sure they do not become lost or in trouble.

Some areas also identified trails according to their difficulty, specifying certain trails for beginners and others for intermediate or experts. We think this is an excellent idea.

The Bombardier study also dealt with the problem of adequate trail signs. While a uniform sign system has been developed, almost every trail area visited has designed its own signing system. Bombardier encourages the utilization of a standardized, international signing system.

Signs should be posted in such a manner that they do not detract from the natural beauty of an area. At the same time, however, directional arrows and reassurance markers should be used in quantities adequate enough to do the job. Most areas felt that occasional mileage signs were helpful, as were signs noting various points of interest along the trail.

The average number of trail signs per mile is 20 to 25. Cost, without erection, would be about $40 per mile. Stop signs should be posted at trail intersections and public highway crossings, if there are any.

Markers should be erected to denote hazardous areas. Areas that snowmobilers should stay away from can be effectively marked off with bright plastic flags or snow fences.

Most of the populous snowbelt states now have snowmobile registration and licensing regulations, with the funds from this licensing going to forest, park, and other facilities for use in development and maintenance of trails, including signing and other costs.

The Bombardier survey shows that it is very easy to stray off a trail when riding over an open stretch of land, and that finding the place where the trail goes back into the forest can be quite difficult. Make sure trails are identified over long, open stretches.

While to the uninitiated banked curves may be considered safer than flat curves, area operators interviewed believe that banking curves encourages high speeds, while flat curves will result in a reduction of speed. Our study shows that banked curves should only be used to protect snowmobilers from a sudden drop in terrain or a fixed or hidden object. Trails that run adjacent to a sudden drop in terrain, such as a deep valley or a cliff, should be avoided, as trails tend to get drifted over and side hilling on a snowmobile becomes difficult. If rerouting is impractical, the construction of a fence or other barrier between the trail and the drop will minimize this problem. But any such fences or barriers must be high enough to surpass snow depth.

The biggest problem, found universally throughout the areas visited in the Bombardier study, was trail maintenance or, essentially, a lack of equipment available to do the job. In recent seasons, Bombardier has been working with vehicles and various types of blades, drags, and other accessories to develop a solution to rough snowmobile trails. The past year and half the company has come up with an eight-foot-wide tracked vehicle called the Skidozer SV200, one of a series of such vehicles that also are designed to groom ski slopes. The SV200 for trail maintenance is equipped with a Bombardier trail groomer as well as blade and other attachments.

Earlier, we mentioned that this winter our company is implementing an extensive program designed to foster safe, more considerate use of snowmobiles. The Bombardier Snoplan highlights a massive trail grooming and maintenance project involving some 75 trail grooming vehicles, with a special test grooming and promotional program to get these into service maintaining trails throughout the snowbelt. Snoplan also includes a new color sound environmental film in which famed commentator Lowell Thomas narrates the pros and cons of snowmobiles in our environment; a completely new edition of our safety booklet; use area and trail presentation, manuals, and brochures available to those with areas and responsibilities for trail development; and other projects.

From Snoplan we expect to gain additional facts and figures to further help park and recreational people and others in creating more use areas.

As indicated earlier, these parameters for safe,enjoyable trails and use areas are primarily for snowmobiling. But most of the same factors also apply to other off-road vehicles, and good, sound trail development and maintenance is essential to the safe enjoyment of all vehicles designed for off-road use.

OPERATOR CONSIDERATIONS— INCLUDING PERSONAL EQUIPMENT

By RUSS SANFORD

President and Legislative Advocate, Motorcycle Owners, Riders and Enthusiasts, Sacramento, Calif.

The term "off-road vehicle" means different things to different people. To be totally precise, an off-road vehicle is one which is capable of traveling cross-country without benefit of roads or highways.

Think about this for a moment! This is much too important a point to be passed over lightly. Recall, if you will, the time you drove the family car across a meadow in search of a picnic spot. Or the time you drove around in the desert in search of your lost dog. Or the time you accompanied a neighbor in his pick-up through the hills, in search of a Christmas tree. Or the time you drove your car out on the ice of a frozen lake, to fish.

We have all of us, in one way or another, operated an off-road vehicle. The difference is that some persons discover an intense liking for this sort of venture and soon become classified as off-road vehicle enthusiasts or "off-roaders." In the vernacular of motorcycling, an off-roader is a "dirt-rider."

It is not my intent to justify the existence and nature of off-road vehicle enthusiasts. But they have their reasons. It may be to visit ghost towns; to collect bottles; to discover historical artifacts; to hunt; to fish; to compete; or just to commune with nature.

With the exception of competition, the off-road vehicle enthusiast utilizes his vehicle in the same sense as the horseman utilizes his horse: it is a means to get from point "A" to point "B." However, the off-road vehicle enthusiast has found this to be so enjoyable that it has become his favorite pastime. It has become the weekend outlet that the family looks forward to all week long.

The off-road vehicle enthusiast recognizes the problems associated with off-road travel and has designed his equipment accordingly. The sand buggy is characterized by very wide, low-pressure tires and an ultra-light-

weight frame and power source. This is not done for appearance' sake, but for the sole purpose of traversing sandy terrain where heavier, narrow-tired vehicles would immediately sink to the frames.

Now, perhaps, we can begin to perceive how some elements of safety are already built in to the design of off-road vehicles.

Although we might tend to scoff at anyone who is foolhardy enough to go riding around in the desert in something as flimsy and ridiculous looking as a dune-buggy, isn't that person infinitely more safe than we were when we drove around in the desert in the family car looking for a stray dog? Was the family car equipped with roll bars? Were all of the occupants wearing seat belts and protective clothing? Were we carrying a spare supply of fuel, drinking water, and food? Did we even bother to take a first aid kit? Did we ask a friend to follow in another car so that we could be rescued in case of a breakdown? Did we leave a message at the campsite indicating where we had gone?

As we think about our own experiences, we can recall many hazards with respect to off-road travel that we have heard about, read about, and seen in the movies. We know that the desert surface is potted with soft spots, and when the front wheel of an automobile drops in one of these soft spots the automobile will flip end-over-end. We also know that open lands are pock-marked with open, unmarked mine-shafts. We know that open lands are cut with gullies and ravines which are undetectable until a person is right on the rim. We know that frozen lakes sometimes have thin ice. We know that distances are often deceiving on open lands, and that persons become easily lost. If we think about it, we can enumerate hundreds of such hazards, but did we stop and consider these when we looked for the lost dog, hunted Christmas trees, or whatever it was that caused us to drive off the road?

The chances are that we did not. Sure, we might have given some fleeting consideration to the matter, but we went right ahead and did what we had started out to do. I consider myself to be a person who is deeply imbued with a respect for safe practices. I was at one time employed by the aerospace industry, and the company I worked for had a saying that went, "If it can't be done safely, don't do it!" I have adopted this attitude in my personal life and many times it has paid off.

But every once in awhile I do something foolish, become injured, and must embarrassingly admit that I knew better. This is really the crux of the matter. Even though we know better, we often go right ahead and perform an unsafe act, gambling that we will once again cheat Fate. Why do we do it? Perhaps this is part of human nature. Or do we feel that accidents are something that happen to other people?

The "dyed-in-the-wool" off-roader will be the first to point out how safe his sport is. He will impress you with the sturdiness of his roll-bars, the gusseted and magna-fluxed frame construction, the safety-wired nuts and bolts which bind his machine together, the quality of his seat belts, shoulder harnesses, and protective clothing. The dyed-in-the-wool off-roader exudes an attitude of competence and confidence, not infallibility. He knows from experience the pitfalls and dangers of his sport. His confidence emanates from knowing that he has compensated for the potential dangers.

But the dyed-in-the-wool off-roader is not the only person to whom we must direct our concern! Our concern must also be for the newly-initiated—the beginner who has just purchased his first off-road vehicle and sets out to do all of the things that other off-roaders do. He is ill-prepared and ill-equipped. He knows nothing of the potential dangers confronting him. And he is the person who suddenly finds himself head-over-heels in trouble.

People are always asking me, "How safe is a motorcycle?" My standard reply is "If you leave it parked in your garage, it is almost impossible to become injured by it!" This is not the answer they expect, but it at least makes them aware that the motorcycle does not have a mind of its own and will only perform the way the operator makes or lets it perform!

You will note that I said, "Makes or lets it perform!" Riding a motorcycle is very much like pushing a wheelbarrow full of gravel. As long as the wheelbarrow rolls along smoothly, it's quite easy to maintain balance, but hit a glancing blow off a rock and the wheelbarrow will tend to tip to one side or the other. Now, you are faced with two choices: you can apply brute strength to the handles and force the wheelbarrow to resume the upright position, or you can let go and jump clear. This is what I mean when I say, " . . . makes or lets it perform."

I once sold one of my used trail bikes to a co-worker who had never ridden before. I checked him out on the machine and rode with him until he got the hang of it. Several days later, in the office, he proudly informed me that he was really getting control of the bike, that he had discovered it was easier to fall on his right side and had progressed to the point that, when he was going to take a spill, he could steer the bike into such a position that he always fell on his right side.

I simply asked him, "If you have that much control over the bike, why do you let it spill?" He looked at me rather dumbly and replied that he had never thought of that. This same fellow has gone on to become quite a good rider and frequently enters competition.

If we can accept the importance of safety education for off-road vehicle enthusiasts, our next concern is from where such education is obtained. Until now, organized clubs have been the only help we could present to the uninitiated. For the most part, the members of organized clubs are usually old hands at the sport and can pass on the benefits of their experience to newer, inexperienced members. This usually comes about through association, but often through club rules and regulations.

The problem with this approach is that, at the most, only 20 per cent of the enthusiasts belong to any form of organization. Eighty per cent of the enthusiasts are classed as independents, meaning that they operate alone or in small, non-organized groups.

I have used the term "until now" on several occasions in previous statements concerning the lack of educational opportunity. In explanation, let me state that California motorcyclists have sponsored a bill to include the classroom phase of motorcycle education as an adjunct to the driver education program taught in the public schools. This bill has passed unanimously through the California Legislature and is now on the governor's desk awaiting signature.

But passing a law which states that motorcycle education will be taught in the school system is by far the easiest of many steps. The National Education Association and the Educational Committee of the Motorcycle Industry Council of the U. S. have been studying the curriculum for such a program for a long time. Just this past summer, the Motorcycle Industry Council sponsored a series of motorcycle edcuation workshops throughout the nation for purposes of providing motorcycle training to instructors of driver education. We can categorize what must be taught into three categories:

1. The first category pertains to the equipment itself. When we engage in off-road activities, we normally work away from a "base station." The base station may be a campsite, a ranch, or a pick-up truck. We must be certain that the off-road vehicle is capable of continued operation, because it must not only get you where you are going but must also get you back. Taking one's family into the desert and experiencing a mechanical breakdown or becoming lost is a very unsafe act.

There are many rules for equipment, but most vary with the type of machine and the use to which it will be put. While roll bars and seat belts are a must for four-wheeled vehicles, they would be a hindrance to motorcyclists. Have you ever wondered why motorcyclists riding over difficult terrain stand erect on their foot pegs? It is partly for balance, but it also enables them to step off the bike if they get into real trouble. For this same reason, motorcyclists keep the rear portion of their bikes clear of objects which could possibly snag on their clothing or cause injury to their bodies.

Four-wheeled vehicles operating in sharply rolling country or in sand dunes maintain upright whip-type antennas with flags attached at the top. In this manner, vehicles can avoid collision when approaching the crest of a hill or sand dune from opposite directions. Likewise, these same whips are equipped with a small but intense light for night opera-

tion.

On the other hand, a motorcycle equipped with such a device would be totally unwieldy due to the reaction of the whip on the operator's balance. Also, a whip could prove quite dangerous when leaving the bike. (But you can bet your boots that the bike rider will rapidly yield to a flag approaching the crest of a hill from the opposite direction.)

Both two- and four-wheeled vehicles should be equipped with an adequate light for night operation, even though the operator does not intend to be out after dark. The cautious bike-rider will completely tape his headlight until needed, both for protection of the light and from broken glass in the event of a spill. Both types of vehicle should carry spare fuel, maps of the area, and a compass. Drinking water and food should also be stocked on the vehicle, depending upon the terrain.

Maintenance of equipment is mandatory. Nuts and bolts which cannot be safety-wired should be checked periodically. The machine's tool kit should be well stocked with everything necessary to effect emergency repairs.

Most important, the off-road vehicle should be painted a color which is in sharp contrast to the terrain in which it will be operated. This will make it easier to be seen by other off-roaders and easier to locate in the event of an emergency.

2. The second category of safety instructions is that of self-protection. Here, we can take a tip from the professional racers. The first item which comes to mind is protective headgear: the helmet. There are many styles and many qualities. One of the biggest mistakes is to presume that a helmet is a helmet, regardless of cost. I have seen young motorcyclists enter a store to buy a sale-priced $9.95 helmet merely to satisfy their father's demand that they must wear a helmet. And I have seen these youngsters accidentally drop the helmet on the floor, only to have it explode like an eggshell. What did they do? You're right! Just reached up and took another identical helmet to the check-stand.

California does not have a mandatory helmet law, but we passed a law last year which prohibits the sale of a helmet which does not meet specified safety standards. Now, if we can just educate our youngsters into wearing a helmet at all times, we'll have come a long way.

I will presume that many of you, when you think of motorcyclists, envision, among other things, a black leather jacket. And while most of us are somewhat embarrassed by the black leather jacket image, we also recognize the black leather jacket as a real life-saver. Furthermore, we consider the black leather pants and the black leather boots to be nearly as important at the helmet. Let's face it! For one reason or another, motorcyclists sometimes come "unglued" from their machines. And when you see what happens to a set of leathers after sliding down a highway at 60 mph, you are infinitely glad that it is some cow's hide and not your own that's been left behind. And the same principle applies off-the-road!

I have seen competition track racers crash at 120 mph, only to get up after a 100 yard slide, re-mount their machine, and finish the race. Of course, there is much more to this than a helmet and a set of leathers. Physical conditioning and dexterity play a large part but, nevertheless, protective clothing is a must for the off-roader.

3. The third and more or less final category of safety instruction deals with the operator's modus operandi. This is where most persons really get into trouble. They operate their vehicles in a manner which is, as we call it, "over their head."

There used to be a bike-riding area near my home in Sacramento. In one place, there were a series of rounded, open knolls about 80 to 100 feet high. The riders would traverse these knolls at high speed, shooting over the crest of one, down into the gully, and up over the crest of the next. Over the years, they had worn quite a wide path. Then, the county extended a nearby street and cut a two-lane road through the area, so that immediately adjacent to the last crest was a sheer drop of nearly 70 feet to the roadway. During the next two years, three riders plummeted over this drop to their death. In each case, the rider was new to the area and racing down this wide, well-traveled path. Those of us who rode there frequently knew where the

cut was and stopped before we got there.

My purpose in citing this example, which unfortunately happens all too often, is to point out the need for educating these off-roaders in a very basic principle: when riding in an unfamiliar area for the first time, slowly survey the area and determine the locations of all potential danger, such as open mine shafts, gullies, fences, pits, railroad tracks, roadways, etc. There are other potential dangers, such as mud, soft sand, loose gravel, wet grass, icy spots, and a myriad of other hazards. All of these can be negotiated if proper caution is exercised. But the person who throws caution to the wind is in for big trouble.

Here again, the beginner can learn a lesson from the professional racer. These riders walk the tracks several times before each race. While they are walking the track, they are studying every turn, every loose pebble, every sandy slope, and every mud-hole. They know before they ever start their engines exactly how they will ride this race. They know when to speed up, when to slow down, and where they can safely pass another competitor. When you consider the number of participants and the speeds at which they travel, it is difficult to comprehend that the accident rate is so very low.

Another surprising fact is that the expert riders, who travel faster and who appear to take more chances, have very few accidents. Again, it is the novice riders who are either involved in, or cause, the majority of racing accidents.

One of the greatest triumphs to a good rider is the day that he graduates from the novice ranks and can ride with the amateurs and experts, where he can feel comparatively safe.

Off-roading in its most rugged forms can be safe if the enthusiast is properly conditioned. The off-roader must be made to follow the example set by the experts. He must learn to keep his equipment in good repair. He must learn to wear protective clothing. He must learn to operate his machine in a manner which is consistent with his skill and ability. And he must be made aware of the potential hazards which he is likely to encounter.

To those of us who are concerned with off-road vehicle safety, this is our challenge. We must devise ways and means of bringing this message to the off-road vehicle enthusiast. And this again is a challenge, when we recall that 80 per cent of the enthusiasts do not belong to any form of organization and are therefore out of contact.

We must start somewhere. In California, we have started by bringing motorcycle education into the schools. Hopefully, our youngsters will get the message and carry it to others.

We are also in close, continuous contact with the organized clubs, and they have been quick to respond. Many clubs which have heretofore closed their doors to additional memberships are now accepting new members as rapidly as possible. Their purpose is to help regulate and control what heretofore has been a totally disorganized form of recreation. Through their efforts, we will also get our safety messages to a great number of persons. In this same respect, many of us are serving as guest speakers in the public schools. The opportunity to visit and speak with driver education classes presents a unique method of getting our message into the hands of those to whom it will do the most good.

Before I conclude, I would like to make note of one other facet which one doesn't normally consider when thinking of off-road vehicle safety. That is the safety of the non-enthusiast who happens to be a joint user of the public lands. We have all heard tales of how the off-road vehicle enthusiasts run other persons off the trails, demoralize the campgrounds, and ride through someone's picnic lunch. As much as I hate to admit it, this sort of insane behavior sometimes does occur. Even though the rate of occurrence is minute, it has happened, and each time that it happens it tends to bring disgrace upon all off-roaders. For this reason, we have sought legislation in California which will bring about the legal restraints which are necessary to maintain harmonious compatibility with other recreationists. We also intend that our motorcycle education curriculum devote considerable attention to educating our future off-roaders in the necessity of these re-

straints, both from a standpoint of safety and from a view towards common decency and compatibility.

We are faced with the honest and legitimate challenge of educating our off-road vehicle enthusiasts, and by meeting this challenge we can bring safety to this form of sport and recreation.

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