

# Vermont Environmental Report

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## GRIFFIN & SKINNER -- PART TWO: Nuclear Power: Is It Safe?

### INTRODUCTION:

Over the past month and a half, since the voluntary shutdown of Vermont Yankee on January 26th, public attention in Vermont has been riveted on the question of the safety of nuclear power.

These were just some of the events that followed in almost dizzying succession.

(1) On January 26, Vermont Yankee voluntarily shut down its nuclear power plant at Vernon. The shutdown came in response to concerns about the ability of a "pressure suppression chamber" to function in the event of an accident.

(2) Three General Electric nuclear engineers, Richard Hubbard, Gregory Minor and Dale Bridenbaugh, resigned as a protest to what they asserted were the dangers of nuclear power.

(3) Robert D. Pollard, a safety engineer for the Federal Nuclear Regulatory Commission, resigned as a protest to safety problems at existing nuclear power plants.

(4) Governor Thomas P. Salmon organized a Task Force of state officials to advise him on the problems associated with the closing of Vermont Yankee.

(5) The Vermont House Government Operations Committee held hearings on a resolution to establish a special joint legislative committee to investigate the shutdown of Vermont Yankee.

(6) Vermont Health Department officials indicated that Vermont Yankee has not one, but at least six major design flaws.

(7) Governor Salmon got agreement from a national committee of governors to set up a special task force to examine the nation's commitment to the development of nuclear power.

(8) Rep. Michael Nawrath (D. Manchester) announced his intention to introduce a bill to close Vermont Yankee until safety questions have been satisfactorily answered.

(9) Rep. James Jeffords introduced legislation in the U. S. House calling for a moratorium on the further construction of nuclear power plants.

In the February issue of the VER, we presented Part One of the edited transcript of a taped discussion between James Griffin and Scott Skinner on "The Cost of Nuclear Power." Part Two is a discussion of "The Safety of Nuclear Power."

In addition to the transcript itself, Larry Keyes for Vermont Yankee, and Scott Skinner have contributed opening statements that address the events of the past six weeks.



## a. Opening Statements

(Scott Skinner)

The urgency of the safety issue has multiplied ten-fold in the last month. The resignations of three highly-respected General Electric managing engineers and a key federal safety inspector have even alarmed people who have in the past shown little concern over safety. In Vermont, we learned that not only did Vermont Yankee have a major design flaw that could make a serious accident possible, but that there are five additional flaws that reduce to some degree the margin of safety.

Two things seem clear in the wake of these dramatic events: (1) Federal officials and nuclear industry engineers are under enormous pressure to keep the plants and the nuclear program going at all costs; and (2) nuclear reactors are not nearly as safe as the government and utilities have claimed. The GE engineers summed it up upon resigning when they said: "Nuclear energy represents a profound and irreversible threat to life on the planet."

(Lawrence H. Keyes, Public Information Director, for Vermont Yankee)

On January 26, 1976, Vermont Yankee voluntarily shut down its plant. This shutdown occurred in response to new calculations that had been made concerning the performance of a "pressure suppression chamber." The shutdown of Vermont Yankee was entirely precautionary in nature. It concerned the unlikely event of a hypothetical accident which the plant must be designed to withstand.

After studies and tests, Vermont Yankee submitted proposals for a revised method of operation and for remedial steps to the Nuclear Regulatory Commission (NRC). The proposals and steps were designed to meet the problems raised by the new calculations.

On February 13th, 1976, the Nuclear Regulatory Commission issued an order approving the start up of Vermont Yankee. The NRC approved the remedial steps that had been taken at the plant: (1) the employment of a differential pressure control system and (2) the structural modifications to the pressure suppression chamber. As of this writing the Vermont Yankee plant is once again running at full power operating level.

At about the time of the Vermont Yankee shutdown an employee of the Nuclear Regulatory Commission and three employees of the General Electric Company resigned. The employees were raising questions on the safety of nuclear power plants. Allegations have been made by various individuals concerning Vermont Yankee. These individuals contend that Vermont Yankee is operating an unsafe plant. They suggest that the Nuclear Regulatory Commission is not doing its job in requiring Vermont Yankee to live up to design standards and safety margins.

Vermont Yankee feels that the information presented by some persons is grossly in error. It is extremely misleading to the general public. A large part of the problem is the need for Vermont Yankee to have an opportunity to respond item by item to this misleading information so that the public can make its own judgements from the facts as they exist and not from misrepresentations.

Vermont Yankee is now actively seeking a forum before an impartial body where they may present an item by item response to misleading allegations.

## b. The Discussion

**Nat Frothingham:** What about this very complicated question of the safety of nuclear power? Scott, would you like to touch on that first?

**Scott Skinner:** O.K. We've talked about the economics -- but safety is still the basic issue facing nuclear power. And the reason for this

concern is that if there was what the scientists refer to as "a maximum credible accident," the consequences could be simply enormous: with many thousands dead, billions of dollars worth of property damage, many injured -- a first-rate catastrophe. So it becomes very important to ask: "Is there any possibility of such a thing



happening?" The federal government through the "Rasmussen Study" has spent many years and millions of dollars to determine the likelihood of such an accident. And Rasmussen comes to the conclusion that a catastrophic accident of the type we are describing at a nuclear power plant is highly unlikely. In fact, Rasmussen says that the odds are overwhelmingly against it: a million to one, 200 million to one, very long odds.

**Nat Frothingham:** But you're still saying that safety is the major issue.

**Scott Skinner:** Yes. Because the question comes up: "What do you think of the Rasmussen Report?" Probability theory is like a computer; it's only as good as what you put into it. Did Rasmussen cover all the bases? What were the odds, say, of the "Great Blackout" of the northeast in 1965? In probability theory something can have odds of one in a million but "that one in a million" may happen on the first go-round, instead of on the millionth. There are lots of questions that can be raised. The one example that I'd like to mention is the fire in Alabama at "Brown's Ferry," one of the largest nuclear power plants in the United States. This fire shut down something like nine out of the fourteen most critical safety systems. The emergency cooling system didn't work. The personnel at the plant were able to escape catastrophe through some skill, and perhaps some luck, by using a pump normally used for another process to keep water on the reactor. But it was the worst accident to happen at a light-water reactor in the history of the industry and I believe that it was close to being a disastrous one.

Now Rasmussen didn't really deal with this problem of one thing knocking out a lot of other things, which is called a "common mode failure." He did not anticipate this because he thought that with safety system piled upon safety system if one thing goes wrong, something else will always back it up. Rasmussen didn't calculate the probability of an event where something happens that makes a lot of things inoperative at once. So it seems to me that although the nuclear industry has an excellent safety record so far, for which they are to be congratulated, we're still in the infancy of the program, and that the Brown's Ferry fire raises very real questions about the overall safety of the plants.

**Nat Frothingham:** O.K. Jim.

**Jim Griffin:** Well, the subject that Scott brings up here, the safety of nuclear power plants, is certainly of great concern to all of us. There's no doubt about it. However, let's take the Brown's Ferry fire. That was a man-made type of accident that developed. And as Scott said, it knocked out approximately nine of the fourteen safety devices. It was the other five, however, that still were

operative, that were still designed into the overall protection of a nuclear power plant, that went into operation and shut this facility down.

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## **"The Brown's Ferry fire raises very real questions"**

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I heard a comment made once, and I think this is very, very true, that one of the most difficult things to do when you're operating a nuclear power plant is to keep it running. There are so many fail-safe, safety devices built into a nuclear plant that any little deviation will immediately trigger an operation that will shut it down.

The Rasmussen Study came up with some very great odds. Scott mentioned, I believe, that the chance of a nuclear reactor problem occurring was one in a couple of hundred million. There certainly are all kinds of other odds that exist within the world in which we live today. (The probability figures that James Griffin goes on to mention here are of 1000 people being killed in any given year due to man-caused disasters of various kinds.) We could have a dam failure, which is one in ninety; explosions: we just saw two within the past month, the one in La Guardia, the one at an aerosol plant in Rhode Island, the odds there are about one in a hundred and fifty; first: we get a lot of those where people die and are killed, the odds there are about one in four hundred; air crashes: there are about one in four thousand; and when you get up to the nuclear level of one in a million, one in a couple of million, it's the same as having a thousand people killed from a meteor crashing into the earth. Again, it could happen tomorrow, or it could happen within the next one hundred years. But no matter what we do in our world, in our society, there's the possibility of an accident happening.

**Scott Skinner:** Well, obviously, there are lots of risks that we face in our society. We take a tremendous risk when we drive a car, statistically speaking. But the problem is that we don't want to add to those risks if we can avoid it. The real issue in terms of nuclear power is the enormity of the potential consequences of an accident.

**Nat Frothingham:** What is their enormity?

**Scott Skinner:** Well, there are various studies here. Rasmussen tended to scale down some of the earlier federal studies. But the update of the Brookhaven Study concluded that in a "maximum



## nuclear power ...

credible accident," the biggest that they could postulate, there might be 45,000 dead, 100,000 injured, \$17 billion in property damage, and an area of devastation equal in size to the State of Pennsylvania.

**Nat Frothingham:** That's the worst possible accident that can be imagined?

**Scott Skinner:** Actually, nuclear critics can imagine worse ones, but this is the worst one that the "feds" can imagine. In Rasmussen's Study, he claimed that the "maximum credible accident" would not be so great. He claimed that property damage would only be \$6 billion; he claimed that deaths would only be around 6,000. There's debate about it but the point is that no one would disagree that if this thing happened, given the least favorable circumstances in terms of population and wind direction, you could have one enormous catastrophe. The question has really shifted to: "Just how likely is that to happen?"

**Nat Frothingham:** I think we may be approaching the end of this discussion.

**Scott Skinner:** O.K. But there is one thing that I wanted to mention in the debate the other night with Jim Griffin. This is a subject that concerns me the most about nuclear power. And I want to get Jim's reaction to this. That's the question of plutonium and the use of plutonium as a fuel. As I understand it, the supplies of uranium and the plans for the future are such that we are going to rely on nuclear materials, principally plutonium taken from the atomic wastes, and used again as fuel. Plutonium is an extraordinarily harmful element. It is a carcinogen. It is believed that even the smallest amounts will cause cancer. Just as important, perhaps more important, only 11 or 12 pounds of plutonium are sufficient to create an atomic bomb. It is not that difficult to make a bomb in itself. Lots of people here in Vermont, on college, even perhaps on high school faculties, physicists and the like, could make it, IF they had the fissionable material, the uranium or plutonium.

**Nat Frothingham:** What about your premise? Can we test that out? Is it in fact true that more and more nuclear plants will depend on plutonium extracted from atomic wastes as a new source of fuel? That was your premise.

**Scott Skinner:** Jim may want to comment on that. I know that the federal government is considering this and will decide by 1977 whether or not to allow plutonium to be processed out of atomic wastes for use as fuel. Also the prime element in the federal energy research budget is the so-called breeder reactor which uses plutonium as a fuel.

So I think it's safe to say that the government is moving along toward the use of plutonium as a nuclear fuel on a fairly large scale. Is that fair, Jim?

**Jim Griffin:** The government does seem to be moving in this direction. We have two choices here: one, you can continue to mine uranium out of the ground; you can fabricate it into the fuel elements going into a reactor, and then you can leave the plutonium in that spent waste material and store it; or two, you can go through the next step of taking the plutonium out of the waste material and recycling it, putting it back into the overall energy-situation.

I don't know which way the government is going to go. As Scott mentions, they seem to be leaning towards the recycling of it, bringing it back into the energy picture. True, it is very lethal; it's a dangerous material; but we have a great many other dangerous materials that are used in our society, in chemistry, in all of the different things that we process and break down and extract. And we'll just have to devise the protective measures to handle it and treat it properly.

**Scott Skinner:** Well, I was really coming to the point. The additional problem with plutonium is that it's essentially indestructible. It has a half-life of 24,000 years. It thus keeps its radioactivity for several hundred thousand years. In other words, once it is in existence, it will continue to be in existence. Now if it's used in commercial power production and we have as many plants as the government wants, we will have several hundred thousand pounds of plutonium travelling around in commerce yearly. If this happens I believe that it is almost inevitable that this material will be diverted for terrorist activity or to foreign countries for making nuclear weapons. And this is very possible because the price of plutonium could approach the price of something like heroin. Which means you're going to have a black market. Once this material is out -- keeping in mind that it only takes ten or twelve pounds to construct an atomic bomb -- the likelihood of a terrorist threat to any large city, or the use of an atomic bomb by one country against another, is almost inevitable. I think it will be simply impossible to totally safeguard all the plutonium that would be in the country if we had a plutonium economy. And to me, this is the single most important aspect of the national debate on nuclear power: whether we should continue toward the fast-breeder reactor and the recycling of plutonium.

**Nat Frothingham:** O.K. Jim.





## NATURAL DIVERSITY

## Saving a precious resource

On January 29, 1976, the House Natural Resources Committee of the Vermont General Assembly heard testimony on H. 490, a bill to create a Vermont Register of Natural Areas. The following remarks are from the edited transcript of testimony by Hubert Vogelmann, Professor of Botany at the University of Vermont.

"In 1960, Professor James Marvin and several other people got together and expressed a concern that Vermont was losing some of its very special natural features: bogs, marshes, old-age stands of trees and other habitats. Bit by bit they were being whittled away: by development, drainage and clearing. This was not because anybody wanted to harm these areas, but nobody really recognized that they were of special significance. So we sat down and drew up a list of potential areas and then we published a little booklet. That was our first effort.

I think there were thirty-six areas. They included the arctic alpine tundra on the top of Mt. Mansfield and Camel's Hump. These areas are really arctic outposts. You can take a class of students, not 1,000 miles to the Arctic, but just to the top of Mt. Mansfield. You can take them up on the lift and show them what arctic tundra is like. Then we listed things like old-age forests. Over the last 170 to 180 years most of our forests have been cut, and that's sad. There's a little piece in Gifford Woods maybe three or four acres that is near-virgin northern hardwoods. And you get some idea of what these big old trees were like. The sugar maples don't look like the sugar maples that we're familiar with. These trees tend to spiral and they just don't look like maples anymore.

Then we identified a number of bogs. One that was singled out was Molly Bog in Stowe. Recently the National Park Service began a program to identify outstanding examples of different habitats around the country and to put them in a register of areas of national importance. And they selected Molly Bog as one of the outstanding bogs in the Northeast; it was given national landmark status. There's a marsh at the south end of Lake Memphremagog which is an excellent marshland system and there's a marsh at the mouth of Little Otter Creek, an absolutely superb shallow water marsh. Both have been designated as national landmarks. There's a coral reef on Isle La Motte that is about 500 million years old, maybe more. It's one of the oldest coral reefs on the continent. You'd never know it's a reef or coral unless you got down on your hands and knees and looked closely.

These are the kinds of things that we think of as natural areas. It's a difficult thing to make a single definition that will embrace all of these things. But basically, **natural areas are habitats which harbor a unique or special assemblage of living organisms and they are more or less stable systems.** They aren't changing. They'll be here next year and in twenty years and a hundred years from now, if they are left alone.

One thing that I think is very important is that Vermont has (probably per area) some of the finest natural areas in the Northeast. Now when we published this booklet about ten years ago I had no idea that this was going to be true. We knew there were some very unusual examples of natural areas in the state. About three years ago the Park Service contacted me. They wanted me to do some work around the East looking at some potential landmarks of national significance. For the last three years I have worked in parts of Vermont, Maine, New York, Virginia and New Jersey and I got to see what these states were serving up as the best natural features that they have. And you know what? Half of them wouldn't even qualify for our inventory because we wouldn't consider them worthy. What this experience has done is reinforce our belief in the areas that have been selected. There are some very fine examples here, and they are among the best in the Northeast. There's no question about it."



## a. Natural Areas Project

### Phase 1 & Phase 2

"As we newcomers on this planet eliminate threads from the magnificent tapestry of life built up over millions of years of evolution, we must remind ourselves that the biosphere is not only more complex than we think, but more complex than we can ever imagine."

G. Tyler Miller, Jr.

The pioneering work of James Marvin, Hub Vogelmann and others was important. For the first time it raised the issue of natural areas and the need for their protection.

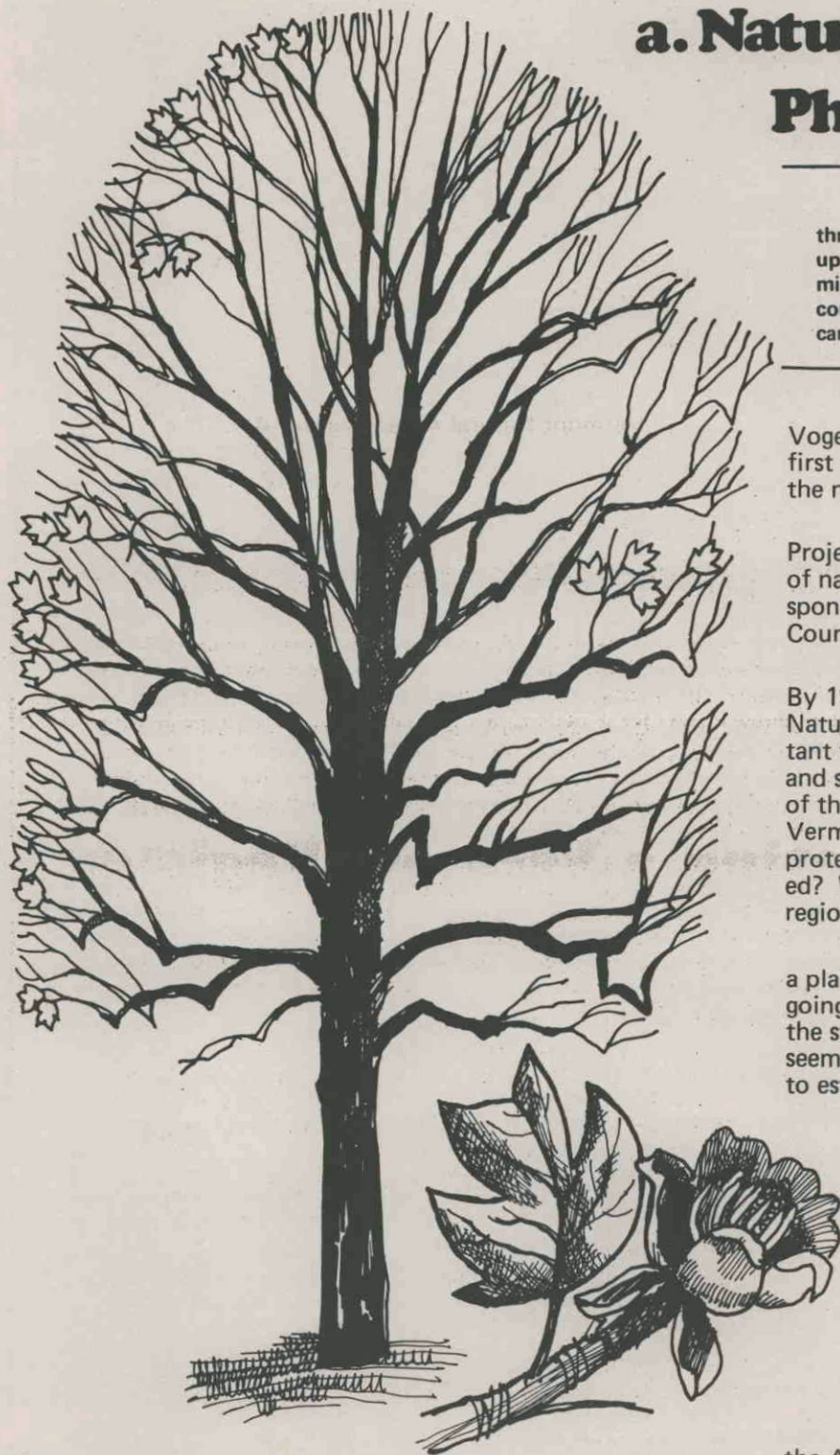
Then came the New England Natural Areas Project in 1972. This was a regionwide inventory of natural areas. In Vermont, this inventory was sponsored by the Vermont Natural Resources Council. Over 1,000 natural areas were identified.

But something had to be done with this list. By 1975 it was clear that a second phase of the Natural Areas Project was needed. It was important to be able to look at the 1,000 natural areas and say something meaningful about them. Which of them were of clear significance to the State of Vermont? Which of them were most deserving of protection? Which of them were most endangered? Which of them were of significance at a regional or a local level?

There were other problems. Putting together a plan for the protection of natural areas was not going to be easy. Given the already large claims on the state's admittedly modest financial resources, it seemed clear that the Legislature would be unwilling to establish another arm of the civil service to designate natural areas and to oversee their protection. It was still important, however, to find some acceptable formula. A structure of management and protection had to be built.

In July, 1975, Robert Klein stepped into this vacuum. He was appointed Director of Phase 2 of the Natural Areas Project. He came to the Vermont Natural Resources Council under a matching grant between VNRC, the federal Bureau of Outdoor Recreation and the Agency of Environmental Conservation.

From July to December, for six months, Klein was hard at work solving the problems of the



THE TULIP POPLAR, outside its normal range in southern Vermont, is a small but nonetheless important fragment of the state's biological diversity.



Natural Areas Project. When Klein finished his work in December he could cite the following achievements.

(1) He had "boiled down" the original list of 1,000 natural areas and indicated 64 areas of clear significance to the State of Vermont.

(2) He had placed the results of the Natural Areas Inventory on the State Computer and he had circulated copies to regional and municipal planning commissions.

(3) He had drafted amendments to Chapter 117 of the Vermont Statutes to make natural areas' protection a more explicit concern of municipal planning personnel.

(4) He had prepared a series of guidelines, with the assistance of an ad hoc committee of the State Environmental Board to assist District Commissions in their treatment of natural areas.

(5) He had prepared maps for District Commissions showing the locations of natural areas on the inventory.

(6) He had prepared two reports. One report entitled, "Planning for Natural Areas," became a chapter in the Agency of Development and Community Affairs' Planning Manual for Vermont Municipalities. The other was the final "Technical Report" of the Project, a thorough discussion of the state's policy toward natural areas and an examination of the problems of natural areas' management, identification and protection.

Potentially, one of Klein's most far-reaching achievements was his preparation of a draft for a Vermont Natural Areas Register Act. The legislation that has been written from Klein's draft is contained in House bill 490, a measure that is currently being considered by the General Assembly.

"But let me touch on another reason why natural area protection is so vital. I am talking now about what you might call an 'ethical point of view', where you are not looking at a natural area as anything that has a cash value, a value to research, or to education, or for recreation, but something which is inherently, not really beautiful in the sense of great scenery, but beautiful because it is something we have inherited; it is some part of the earth that is special. It is the most interesting, the most pure example of natural processes that we have. And it seems foolish to throw it away for something that is worth much less. Housing developments, roads, can go virtually anywhere. But natural areas are found only where they occur and you can't create them, you can't reconstruct them. They are there: if you destroy them, they're gone forever."

Robert Klein, Director, Natural Areas Project II

## **b. H. 490 -- Creating a Vermont Register**

Of all the processes that Robert Klein's work has set in motion there is no undertaking that he feels is more important than the establishment of a Vermont Register of Natural Areas. To Klein, it is the indispensable initiative.

This is how he explains it: "A Register gives a focus to natural areas activity; it draws all the efforts together; it provides to natural areas a certain status and protection."

One thing Klein emphasizes. The registration of natural areas does not take private land and put it into the public domain. It simply lists natural areas and most landowners are pleased to learn that they are the guardians of something rare, something special. A Register responds to this sense of pride by giving recognition.

The bill that Klein is supporting was a collaborative effort. It was written by the Technical Advisory Committee that was a part of the Natural Areas Project. This Committee was assisted by the Legislative Council. The result is House bill 490.

H. 490 is a piece of straightforward legislation. Twelve states have already created Registers of Natural Areas. The State of Maine established a "Register of Critical Areas" in 1974. In the Vermont bill there are essentially two provisions. There is one provision for the creation of a Register, "the official record and inventory of natural areas of state significance." There is a second provision for the creation of a Natural Areas Advisory Committee.

Klein feels that the two provisions go hand in hand. The Register is established to confer status and recognition on natural areas. The Advisory Committee is established to supervise the entries on the Register. Klein is aware of the reluctance of legislators to create more government boards, committees, or to add to the size of government. But he points out that the experts that are needed to identify natural areas are not part of state government. Klein feels that the creation of an Advisory Committee will give the state access to people like Hub Vogelmann and Jim Marvin. And this is imperative if the Register is to work.





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## c. The Next Step: A Proposal

Robert Klein is eager to move ahead to the next step. He sees a logical progression leading to Phase 3 of the Natural Areas Project. Phase 1 was the collection of data and the original list of over 1,000 natural areas; Phase 2 was the refinement and evaluation of this list. It was the further task of proposing a structure for natural areas management and protection. Phase 3 would continue this effort.

In Phase 3, the Natural Areas Project would return to the field, not to collect data, but to disseminate it. Klein looks at his work over the past six months: the reports he has written, the administrative policies that may conceivably evolve, the legislative proposal for a Vermont Register. Klein is convinced of the need to apply the information that has been assembled. Nothing, he feels, could be more wasteful of his efforts than the failure to use the results of this Project and implement these results at a local or regional level.

Klein sees his own role in Phase 3 as that of an "educational ambassador" for natural areas at the local and regional level. He wants to meet with town and regional planning commissions. He wants to explain what natural areas are and describe the steps that can be taken to protect and manage them. He wants to identify the choices. He would talk about easements, non-binding agreements, tax stabilization programs, management techniques. Klein is keen to make direct contact with landowners. "We have identified 64 natural areas that are of State significance," he says. "Natural area protection programs will succeed only through landowner cooperation. We want people to feel they have a stake in preserving Vermont's rich natural diversity."

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