ORAL HISTORY INTERVIEW
E. RICHARD "DICK" VINCENT
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INTERVIEW CONDUCTED FOR
FISHERIES DIVISION
MONTANA FISH, WILDLIFE AND PARKS
HELENA MONTANA
INTERVIEW CONDUCTED BY MARGIE PETERSON

[Beginning of Recording #1, 2/23/18]
INTERVIEWER: This is Margie Peterson. Today is Friday, February 23, 2018. We are beginning the oral history story of Dick Vincent, retired fisheries biologist from Fish, Wildlife and Parks. We are at the Region 3 Headquarters on 19th Ave in Bozeman, Montana. Okay, Dick, do you want to begin with some biography, where you were born, where you grew up and where you went to school.
VINCENT: Well, I was born in Bozeman, June 4, 1940. Both my Mom's family and my Dad's family have been in the Montana area for a long, long time. My Mom's side came in 1865 and my Dad's side in 1886. My Dad's side lived in McAlister where my grandfather was born and my dad was born.

INTERVIEWER: And McAlister is…
VINCENT: Close to Ennis, about six miles north of Ennis. They worked on ranches in that area and my great-grandfather was a teacher in Ennis. That's what he came here in 1886 to do. My Mom's side came right after the Civil War, in fact they were part of the Civil War and I'm sure were trying to get away from all the adversity. He started a horse ranch in Butte. My grandfather on that side was born in Butte as was my Mom. So the family was in southwestern Montana. Dad went from ranching as a kid to gold mining and that's what he did all his life, in the mines. One type of ore or another, but followed by phosphate. We lived in Norris in 1945, '46, '47. I went to the first grade there. Every evening, Dad loved fishing, and we'd go out often and fish the Madison. My grandfather on Mom's side had a truck farm on the Madison

River just down from Cold Springs Creek. He fished all the time. That's all he ever did, I think, is fish. So my brother and I would go over and spend two weeks in the summer and fish the Madison. He would ask where do you want to fish? And I'd say there's only one river to fish and that's the Madison.

INTERVIEWER: How old do you think you were at that time?
VINCENT: Probably seven to ten, that age. We moved to Garrison in '47 because he went to work at the phosphate mine over there. I went to the local Garrison school and then we'd go up into the mountains and lived in the phosphate mine schools. There were 18 kids in eight grades. I was one of two in my grade.

INTERVIEWER: Like a one room country school.
VINCENT: It was one room. The teacher did everything, all grades. Then Dad decided to move back to Garrison and then I went to Jr. High and High School in Deer Lodge. That's where I graduated in '58. Again, both my Dad and my grandfather were big time fishermen, they loved that. The Madison's where they'd fish and that's where I fished.

INTERVIEWER: Do you remember how old you might have been when you first thought about becoming a fisheries biologist?
VINCENT: 19. I was working at the big truck stop in Garrison, called Welch's Truck Stop. He hired me when I was 13 to work there and I worked the summers. And when I graduated I didn't know what I wanted to do. Maybe I'd join the Air Force or something. I just didn't know what that something was. So when I was working at the gas station, I had the afternoon and graveyard shifts, and I had a lot of time to think. The local game warden, Bob Miller, he'd stop… he was in the Deer Lodge area at that time. I always liked wildlife stuff. So I asked him, what other jobs are there besides game warden. He said there's fish biologists and wildlife biologists even though it was early in their invention. So I asked where you would go to school if you wanted to be one of those. He said MSU. At that time it was MSC. I thought, that's what I want to do. And I had a lot of time to sit there at 3 in the morning and I knew I didn't want to do that, although it wasn't bad, and I didn't want to mine and I really didn't like ranching. That didn't appeal to me at all even though my background was that and I knew a lot about it. I made up my

mind I was going to go to MSC. I applied and Dad never understood what I was doing, he said he didn't know what biologists were and I didn't either but it sounded good to me. I started in '59. Interestingly enough I had some other influences on fisheries in high school. My high school teacher on several courses, chemistry, physics and other courses was Bud Lilly. Bud at that time was the teacher, and a good teacher, and he had a little fly shop in West Yellowstone. He'd do that in the summer time and teach in the winter. He really built it into a much bigger place later, but it was a little tiny store. I fished the Madison a lot even though we lived around Deer Lodge. Fishing around the Clark Fork wasn't so good. The Clark Fork was yellow, there were no fish in the Clark Fork, it was mine waste, and the river banks were blue green. The late '50s, up through about '57, '58. I actually did a couple small projects under Bud on water chemistry. I'd go sample insects and see what was in the water. There wasn't much in there. It was pretty simplistic and small and it interested me. And I thought that all of it was interesting and I'd like to do something like this. I didn't understand too much about fish management. I actually wrote a letter to the state in 1958 that said the Clark Fork wasn't very good. It was so polluted; there were a few fish here and there. And I asked them why didn't they stock it? Believe it or not, I said if you stock it, it'd be a lot better. Ha, ha. That was the norm back then.

INTERVIEWER: You were in high school when you wrote the letter?
VINCENT: Yes, I was a senior. And they presented me a copy of the letter when I retired, they framed it. It was like, okay, I didn't know any more than the rest of you at that time. Ha, ha.

INTERVIEWER: You knew you were interested enough to get involved in it and see if you could make a change.
VINCENT: Right. I didn't know what to do. I had no information to work with. I remember when they started to clean the Clark Fork up and I was working at the same truck stop. These big semis would come with tin cans and they'd call it the Tin Can Express. Some entrepreneurs would go, you could pick up metal out of the river and it'd be copper plated. They threw these cans in the river and came back and harvested them later and they'd get the copper cause it would plate on the cans. I think at that time Anaconda Copper Mining Company decided that was their copper and they started the ponds. Things started to come around when they put the ponds in, it started getting some of the heavy metals off the bottom. There was everything you

name it, arsenic. We actually started to catch some brown trout in the river around Garrison. There weren't very many and you kept a few. The Blackfoot was dewatered, it wasn't a great fishery but I fished it.

INTERVIEWER: Was that from agriculture?
VINCENT: Yes, in the summer time it got pretty low. We fished some of the tributaries; there were a lot of cutthroat at that time. When we lived up at the mine school, my brother and I were probably 8, 9, 10 years old, we would walk two miles down to a little stream called Rock Creek and we had fun catching them. Dad said he didn't want to eat any of them, just leave them. We didn't bring them home.

INTERVIEWER: That was the beginning of catch and release for you.
VINCENT: Yes, he said, we aren't going to eat them, don't drag them up here. All we wanted to do was fish; we didn't care about the eating part.
[paused]
[End of Recording #1, 2/23/18]
[Beginning of Recording #2, 2/23/18]
VINCENT: Once I decided on MSC, I decided to start in the fall of 1959. I went through the registration process and was accepted. I had an uncle and aunt in Belgrade who decided to let me live with them during the first college year 1959-60. This really helped me financially as I had to pay for my own college expenses.
So I went to MSC and the first summer of 1960, I'd never been east of Livingston prior to that. Cliff Hill, the manager in Glasgow hired me. He said, here's a truck, a boat, a small motor and here's some gill nets. And here's all the fish ponds I want you to survey. At that time, that region was the whole eastern Montana; there was no Miles City region. I saw ponds in places I've never seen in my life. All around Fort Peck, the lower part, northern part, the eastern part, I spent the whole summer doing that. During the summer, interesting enough there was a two-week vacation. No biologists there other than him. He said I don't really have any work for you to do, I'll send you over to Region 2 to Art Whitney for the two weeks. Missoula. Art was the Fish Manager in Missoula. So I got my first introduction in a vague attempt to count fish and what they did was they had a guy who had a truck with a huge generator on the back. They'd

back it into the river, start it up. They said the only electrofishing they could do was however long the cords were from the truck. They were sampling fish down near Rock Creek on the Clark Fork. I spent two weeks getting my introduction into electrofishing. Although that electrofishing is nothing like later developed, but it was interesting and very primitive. Even after you shocked all the fish, you didn't know what it meant. You had a bunch of fish but you didn't know what that meant. Then I was sent back to Glasgow. Summer of 1960. Missoula is when I got to meet Art. The biologist was Ralph Boland, in Missoula.

INTERVIEWER: Did you go back to school then?
VINCENT: Yes, I had my sophomore, junior and senior years. The next summer I got a job with the department at Kalispell under Laney Hanzel. So I spent two summers fishing, we were doing the cutthroat movement on the North Fork and parts of the Middle Fork and movement from the tributaries down to the lake and back. So we fly fished, there were four of us. And we'd get in these boats and float maybe ten mile section and catch fish, weigh, measure, and tag them. And we spent two summers. I think I caught and tagged over 2,000 fish. Some were too small; they wouldn't let us tag under a certain length size of 7 inches. Caught a lot more fish than that but those were the ones we tagged. And they use a leg band, a bird leg band for the tags, wrap around the lower jaw. Probably not the best tags on the planet but that was all we had. That was the best we had. So I spent two summers working for Laney and Boyd Opheim, he was the manager there.

INTERVIEWER: So you went from Glasgow to Missoula to Kalispell and you were in college.
VINCENT: Yes, two summers at Kalispell. Then I got my degree and I wanted to go on to get my Master's. My advisor, Dr. Brown, told me that if you didn't get a Master's you might as well not have come here cause you weren't going anywhere. You didn't know how to do research yet. Master's was the best part, that was the best part of my education. We got into stuff that was far more interesting. But at that time, more was going on and the draft said my deferment was gone so I had to quit school.

INTERVIEWER: I thought they let people stay in college at that time.

VINCENT: They didn't let me. So in the fall, let me back up. I got a project started under Dr. Brown and Dr. Graham where I worked in Yellowstone Park and did an aquatic insect study on the effect of the Norris Geyser Basin ponds on populations of insects. So I'd sample above the area and below it. I had to sample every month of the year. So I did a lot of snowshoeing into the Park.

INTERVIEWER: Did you have any federal regulations to work under?
VINCENT: No, they just said, do it. It was a grant by the National Science Foundation, I'm not sure now, a very large grant. There were three doctorate students and me with my master's all working on effects of water and the effects of the geyser basin on populations of insects and aquatics. So I got to work with Jack Heaton, who was with the department. Later, he got his doctorate and taught. He was Larry Peterman's advisor in Wisconsin. It's a funny world, it just kind of circles around. Jack and I, I knew Jack well and he helped me and I'd help him sampling. That summer of '63, that's when they jerked my student deferment, said you have to go to the draft under 1-A. That wasn't what I had in mind. If I apply to stay in the same field and apply for a federal health service you can go in as an officer and work on biological things. But you have to apply and I had to apply in Browning. They said we'll give you the deferment until they say yes or no. So I had to go back and work at the gas station in Garrison again. I couldn't go to school cause any day it could change. I lived in Garrison again that winter. And it was up in the air because if I go with that National Health Service, that's three or four years or I could go serve my two years in the Army. That drug on and on into February and they still hadn't made up their minds yet. Then they said no about the Health Service. So the draft said since I was jerked around so much they were going to give my deferment back. Ha, ha. I wanted to get my Master's, I was worried if I got too long a delay I would never get back there. So I went back and my project was still intact. They said just keep on going. They saved it for me. The first year I lived with some other graduate students. The interesting part of that world was how come I got this job because during my second year of graduate work the guy I was living with left and I was looking for an apartment to rent. I was driving up and down the street looking for an apartment and I saw a sign and stopped. A lady comes to the door and I told her who I was. And she said that's funny my husband is the fish manager here, Bud Gaffney. I said really? Ha, ha. So I rented that room and we got to talking all the time cause he knew I was a

grad student in fisheries. He was trying to get a project put together to do electrofishing development and fish populations quantification in large rivers. He couldn't get it off the ground and he was having a hard time. He asked me if I wanted to do it and asked me to take the job. No interview. They didn't do that back then. H said, "You're hired. When you get your Master's, you can have that job." Karma or something like that.

INTERVIEWER: That is amazing. You almost went into the military. And instead of that you rent from Bud Gaffney who wants you to start his electrofishing project.
VINCENT: It was a shot in the dark, driving around campus and looking for a rent sign. He lived on 9th and it was close to campus. And I just happened to see it. I'd never met him before that. This region wasn't the one I had worked in. He asked me how I'd go about it. No one knew much about this. There'd never been anything done in our streams. It was poke an electrode in here and you'd shock 100 feet of stream and count fish. Then you get the data and you wouldn't know what it means. Was that all the fish in that section or just some of the fish in that section? Were the sizes appropriately represented and the species? You didn't know, it was just a bunch of fish. So when I got the job I was also assigned the scale reading laboratory for aging.

INTERVIEWER: Yes, we want to get into that too.
VINCENT: I've probably read more fish scales than any human should.

INTERVIEWER: I'm sure you have. You were still going for your Master's.
VINCENT: Yes, I got my Master's in '66. Then I still had to deal with the service because it went back to 1-A. Turns out, to a fluke -- I have a birth defect; it's a bone defect in my chest, through my Mother's side of the family. I was standing in line, they were doing this test, and they said, you can't be in the service, you can't carry a backpack. I said, how come you didn't tell me this in the three or four other times I was 1-A. They said we don't want any part of you cause if you hurt yourself we'll be paying you forever. They said you are 4-F. Leave. I said, okay! Then I can accept the job. I didn't really want to go fight in Vietnam, no offense, that was the last thing, I wanted to go to work and do what I was trained to do. I would have done it but they said just go get dressed and leave. I said, okay. Ha, ha.

INTERVIEWER: So you called Bud?

VINCENT: I said I'm not going into the service and it started there. And more weird things happened. The Madison River -- I grew up on it and it was the love of my life, it was the best river on the planet. Because that's what I knew. Bud said just do what you have to do. Whatever it takes, if that's what you need to do, go do it. It's up to you to figure it out. I just started doing different experiments with different ways and it evolved… we had aluminum boats we worked out of and put the generators… the generators at that time powered the electrofishing was a DC generator. You had no control how much went in and it's whatever the motor and the generator put out. So you couldn't adjust anything. We tried AC and that kills fish so we couldn't go there. We got into where we were using boats and I developed a Mark and Recapture System cause there was no such system. It was a counting system. You shocked fish and you counted how many you got. It didn't represent much of anything by counting how many fish you got that day. What did that mean? How many did you miss? How many were still out there? So I spent a lot of time with George Holton and Tom Leike, he was a statistician. I worked back and forth with that monstrosity of a computer they had, it was a card system in the Bozeman office. I spent a lot of time back and forth trying to develop ways of doing estimates; we didn't have computers, calculators, anything. It was just manual.

INTERVIEWER: You were testing on the Madison now?

VINCENT: I did experiments between the Madison and East Gallatin. It was close and we'd try different techniques, different electrodes, booms vs. mobile electrodes, a whole pile of different combinations to see what would work best. In the meantime, we had no way of regulating power into the river; it was whatever the generator gave you. My uncle was a TV repairman in Bozeman, Jim Fisher. He was really good with electronics. So I went to him and said we need some way to take an AC generator which you can buy readily and convert it to DC that would regulate. Working with him, he made something he called the Fisher Box. We could regulate how much power it put into the river, and you had your meters and you could tell how many amps and voltage you were putting in at any one time. There's a way of taking AC and flip part of it over and make it one half current, the DC current. So he built the box with the specs that I told him I wanted. I knew what I wanted for output. So that was the standard electrofishing box

for a number of years. He got bored with just making that so he turned it over to some other people who did more commercial output of that. I was lucky to have him around to do this for me. We even took some trips, Bud and I, to Seattle to another company, Smith Root but they had a small battery powered unit and when you work on the Madison River and the Missouri River you need more power than that. They weren't big enough for what we wanted. So I ended up developing the electrofishing technique, how to get the fish, which meant not only what was the most effective way to electrofish them out but define how long a section we would work in. The bigger the river, the longer the sections had to be because you're sampling efficiency decreases with size. So then we had to have a way to estimate a portion of the population, that's where the Mark and Recapture came in. I spent a lot of time with just big data, with George, he'd run it through, to see how we could come up with a way of doing it. Then you'd have to know when you got all done, it was fairly complex, you had to know what you were sampling, but how many you need to sample to come up with… I actually came up with estimates on how many fish were in a given section. Then the age and growth came in and I could go to the scale lab and I could tell you how many of each age, you divide it into size and age. The age is more important than size because what age structure tells you -- is recouping good or bad. If you say there are 1,500 7-inch fish, what does that mean? We know from aging that yearling brown trout in the Madison would be from 5" to 9" but then when they grow there would be overlap; you have to know how to divide them out. You start to estimate fish by smaller size groups because we found that not all fish have the same shockability. The smaller the fish it takes more electricity to shock them but they can't get away easy. So you end up with a curve. The smaller fish, you never could get a good efficiency on them. If they got to about 10" to 15" they were the most shockable and catchable. Once they got past 15" they were more shockable but they could also get away from you. So the curve started to peel off back the other side. Then we had to divide and estimate by small groups to keep the efficiency the same. It's probably more detailed than necessary but the concept was we had to do size structure. Then you take the size groups and take the percentage of how many of those in that size group were 1s and 2s and then divide them again.

INTERVIEWER: And you pioneered this method?

VINCENT: Yes, I did it all but it was fun.

INTERVIEWER: Did it also tell you anything about habitat in the water?
VINCENT: Yes, that's the good part. Once they tell you how many fish there are, 1s, 2s, 3s, 4s, 5s, if you apply that to waterflows or habitat, then you can compare what the fish population was doing versus another type of habitat, or this flow versus another flow. You have the tools to evaluate what habitat is better, what flows are better, a whole pile of things you can't do if you don't have that initial data. You could only guess what it meant.

INTERVIEWER: What you were doing was the baseline data since you had nothing to work from before this.
VINCENT: Yes, there was no data.

INTERVIEWER: You came up with the method on how your uncle should build the shocker.
VINCENT: Yes, I knew what I needed and he said he could do it.

INTERVIEWER: Then you came up with this baseline data…
VINCENT: How do we get this data to apply to other studies that others want to do. Bud said if we didn't know what's in, there how do we know if we're doing a good or bad job. You're only guessing. Fisherman analysis of what's in there is poor because what you catch one day doesn't tell you what's in there, regardless of what they think. Ha, ha. You can have really good data and the next day the data could be poor. It can't be good and poor in the same week. People never learned that as fishermen, they gauge it by what they did that day. And then their memory fails them over a year and they only remember the good days or the bad days, not what their thought process was. I've even had fish biologists tell me, they've caught this kind of fish and I think you know better than to say that. There's no way you can judge what's in there based off what you caught. This gave us the tools. Once we had the tools then we could do studies. We did a number of them and once you had the tools to make estimates, and there was a lot of … more detail than people want to know but it was a lot of work. It took months of grinding out different things. We didn't have the beauty of computers. It would have been so much nicer to have that. But we didn't. You had to do them with a hand calculator at best.

INTERVIEWER: Yes, the data was so important, just to get the baseline to start with, and a lot of work, I'm sure. So to backup just a little bit, once you had the electrofishing equipment, tell us a little bit about how it worked.

VINCENT: We started out with aluminum boats and the boat was the negative, part of the field. Then we had a mobile probe. At first, the first people who did it sat on front of the boat and had the mobile probe and just put it in the water. It went just where the boat went. There was a person with a dip net. That was fairly ineffective. So I decided we needed to stand. Now in this new safety world, I probably would have been done-in over that, no guard rails, etc. Things were different then. You just stood up and the guy who was doing the electrodes stood up. He threw it and we had to design electrodes that were easy to throw. There's a relationship on the positive electrode side to the negative in case of a metal boat. But you needed a much bigger negative than a positive. If the positive got too small the fish would knock out. They would go into narcosis. You had to have a reverse triangle. You couldn't have a point, we tried it and it just knocked them out and they floated off before we could get them into the boat. Nothing worked until you could get them netted and into the tank. Then we could measure and mark them. Whether we used the thin clips or fish tags or whatever we wanted. Then we'd release the fish. That's another thing that had to be developed. Now you mark all these fish, the theory is once you mark 1,000 fish you come back at a certain length of time and you assume all those fish would be distributed equally, so the chances of electrofishing a marked or unmarked fish were equal. We had to know something about movement before we could get to that. We had to use numbered tags to make sure the fish weren't here today and gone tomorrow. We found that fish really don't move much. If you found them under that bush, they'll be there later. A small percentage move around more. Most of them stayed, which was good for what we were doing. You didn't want marked fish leaving your controlled study section which could be four miles depending on the stream. All those had to be decided how many fish had the mark in relation to what we thought was out there. Then you'd come back and there was a certain time we had to finally learn how long you had to leave them before you could come back. Once you shocked a fish, it wasn't shockable right away; you had to give them time. We found out it was about a week. In a week, you could come back and do your recapture. We tried different things and then you had to decide without being biased. We found if you came back too soon all the

marked fish were in one clump and if you just happened to hit that it would be disproportionate. But a week would work; they were back where they belonged.

INTERVIEWER: Did you find different species than you expected since you knew what was in there?
VINCENT: I knew the species, but not all species shock the same. Rainbows shock differently than brown trout.

INTERVIEWER: How long do you think it took to figure that out?
VINCENT: You see rainbow are more active and less predictable. Brown trout are pretty predictable, along the shoreline. The rainbow are just about everywhere. You had to be more careful with rainbow because they are hyperactive and they would die from too much activity. They would freak out and get exhausted and die. We had to know what we were working with between the species. Those were the two primary species. Some cutthroat, whitefish we didn't mess with at that time. They didn't like to be shocked at all, it was hard on them. So we had to be careful. Lot more fragile than trout. Then we had to know species composition when we'd do all this. We were doing other studies too. Like on O'Dell Creek we were doing habitat work. Estimate sections on poor habitat sections, what the bad habitat was like in relation to the good habitat. In the Madison we were doing whatever we could. Interesting on the Madison back in the '60s, waterflow was controlled by Montana Power Company. They had a large reservoir at Hebgen with stored water and the power production was out at Ennis. The way they stored water was to stop the river until it filled up and they'd do it before the runoff occurred. They'd see not much snow and they'd shut it down. And if they saw a lot of snow they'd let water go longer. It wasn't very scientific at all. Ha, ha. We were gathering stuff and we noticed they would dewater the Madison River in February, March and early May, before the runoff. They'd take half the water out of the river. And we were seeing some poor recruitment because of that. With two years of data, maybe three, I had enough data that I was able to go to Montana Power Company. The president of Montana Power Company, the director was Frank Dunkle, Art Whitney and Bud Gaffney and myself. We'd sit down with the data I'd gathered and we showed Montana Power, here's what your flows are doing to recruitment on brown trout. We had sections above Ennis Lake, Varney and one below Norris. I went to the Soil Conservation

Service to see Phil Farnes, we worked up a flow pattern and said if you do this you'll fill and you'll never have to worry. You won't have to take water early, there's plenty even in bad snow years. The snow survey will tell you when you should start shutting it down. We only had two years of data but that's all we had. Two years' estimates. So we said, if you do this we think it will be better. And they agreed. Surprised me. They said, okay. So they changed the flow and said we'll operate under this now. We told them we didn't want the flow of the river to go below a certain number, maybe it was 700 cfs in the upper by Quake Lake. They agreed. That was natural flows on the long-term average. The next year, the recruitment and the population in the Norris area just jumped. We had a section at Varney which was a better piece of river than Norris, Norris had thermal problems. Not as good habitat. It responded and the upper river did no response. I thought that was odd. Why did one respond to flows and the other didn't. Varney had more benefit than Norris on the percentage basis because the further down, if they took 500 cfs out it was less proportionate flow. Al Elser was in the region at that time. He was the Livingston biologist. And I said, I'm going to sit down and look at all the differences between the two sections. I wrote down everything similar and everything that was dissimilar. This one should have done better than this one. The only difference was one was heavily stocked, Varney was heavily stocked. Norris wasn't considered worth stocking. They stocked with catchable rainbow. The Federal Hatchery at Ennis stocked the Madison River with between 100,000 to 120,000 a year; 10 inch, they were big fish. No one had evaluated what that meant. The sportsmen said if we don't get stocked we have nothing and we'll go broke up here if you quit stocking. So each year they would ask for more. They'd go to the director and Art and ask for more.

INTERVIEWER: And it was actually doing damage?

VINCENT: Right, without data, you had no way of knowing. So I looked at that. I told Bud the only difference I can see is one is stocked and one isn't. Habitat-wise Norris isn't as good, but not bad. Fishing pressure-wise, Norris was fished year round. Varney was closed all winter at that time. Fishing pressure was about equal, with year-round data. I went to Bud and I said, what would you think of the idea of not stocking that section for three years? I would do a three-year study, not stock Varney. Keep Norris the way it is. Then I had O'Dell Creek I was doing habitat work on, I had really good estimates there. It's a spring creek, it never varies. Didn't

have rainbows but it had brown trout. I said, we'll just stock this one and not stock Varney, leave Norris the same and then we'll set up a new section on O'Dell Creek the way it's always been, with no stocking. It was private land. It was pretty limited.

INTERVIEWER: When would this have been, in the late '60s?
VINCENT: 1970 would be the first year. I had population estimates on the Madison from '67, '68, '69 on Varney, Norris and O'Dell. We'll just switch everything in '70. We'll stock O'Dell Creek, it's never been stocked; quit stocking Varney, and leave Norris alone. However, that created an uproar beyond anything you can imagine.

INTERVIEWER: So the sportsmen's groups…
VINCENT: We had to go to the sportsmen and tell them what we wanted to do. In those days, the fish manager had full authority to change stocking. They said, not in this case you do. It'll have to be commission approval. Frank Dunkle was gone, Don Brown was the Director. Dunkle ran for Governor and lost. We had public meetings and it was just nasty. Sportsmen and tackle shops, motel owners, restaurant owners, they said you quit stocking, we're done, we'll go broke. I was asked to leave bars, we'd be in having a beer and they'd ask us to leave. They damaged some of our equipment on the streets. They unhitched a boat, loosened it.

INTERVIEWER: They were mad enough but they didn't know how to tell you.
VINCENT: I was called lots of things. I didn't take it personally.

INTERVIEWER: They'd never heard of that idea before.
VINCENT: No, and they said, not stocking fish is insane. And I told you I made a request in high school. That was my idea what you did. So that was fisheries management to people. They didn't know of waterflows. They just weren't worried about that. They thought if we throw more fish in we're fine. There were people who didn't like it, Dick McGuire didn't like the stocking, Tom Morgan wasn't a big fan of it. There were some sportsmen around there, Spud Cain had a tackle shop, he was somewhat sympathetic to no stocking, the experiment. It was just a ten-mile reach.

INTERVIEWER: So everybody was getting angry over a 10-mile section? They didn't want the study done.
VINCENT: Then I ran amuck against our own department, the hatchery section. They wouldn't talk to me. We went to a meeting and they turned their backs and walked away from me. Even Bud was astounded. It came down to where the study was going to go. If Art had said no, it would not have been done. We wouldn't have done the study. Art was a super person.

INTERVIEWER: Was Art in the Helena office?
VINCENT: He was chief of Fisheries at that time. I went over and over the data with Art and Bud and the others to see what they thought. They said it's worth a shot, experiment wise. It's just an experiment. It may prove nothing, it may eliminate something. I said the way the data reads suggests that it will do something but until you do it you don't really know. Just a shot in the dark. And now we have the tools to do it. We knew flows weren't the problem. We already stabilized the flows. But it wasn't answering all our questions. Don Bianchi was the Information Officer at that time. He jumped the gun a little with saying some things and got everyone steamed. He went to the commission meeting where Art gave their testimony. And one of the commissioner's asked Art if he would put his job on the line to do the study? And Art said this is not about yes or no, this is just a study. And no. And we're just doing a study. It could mean nothing when we're done. That's how political it got. I got yelled at by commissioners and everybody else.

INTERVIEWER: Well, you were young enough to be able to let it go because you wanted to do your job.
VINCENT: You had to let that go. I knew it wasn't personal although at times it got that way. I had to ask a few people to back off when they were screaming at me, they'd get right in your face. We had to stay in Ennis during the nights we were shocking and at breakfast there'd be no peace. You'd go to the bar for a beer later and play some pool and one of the ladies who owned a motel said, get out of here. We don't want your kind in here. So I started to take my crew out but the bartender said we were welcome so we stayed. We had money to spend. She just lit into us. I know she was worried about her money, I got it. So we commenced with the study and I was just stunned with the first year of data, I was not expecting the results I got.

INTERVIEWER: And what did you get?

VINCENT: The population of rainbows doubled in the first year because the mortality rate…. The population was way below capacity. Whatever was in there got to live. You saw a nice response. You had to have new recruitment coming in. But what we were seeing when we got the data put together is the summer losses of mortality with stocking was about… 80% of the fish in the river died in the summer. In the winter there's low mortality, when there's no fishing. I said, that's odd. You would think it would be reversed. I recognize people catch fish and we did creels and they weren't keeping that many. What we found when you stocked, there were huge losses.

INTERVIEWER: What size were they stocking with?

VINCENT: Ten inch. But with behavior you are looking at fish that are different than what's in the wild. The whole catchable program evolved from just stocking when they stocked little fry and fingerlings. In order to get a catchable economically, Rainbow spawn in the spring. You take those eggs, you can't use them that year, they're never big enough. You have to hold them a full year plus another two months. You hold them about 14 months before you can stock them. That wasn't economical so they took the fish in and established the broodstock. By selection you altered their spawning time til September from April or June. They'd spawn in the fall. That's not what they do in the wild. But if you spawn the eggs in the fall those fish will be big enough next spring to stock. You can feed them all winter and they'll be big enough. Now we have a fish that has no clue what they're doing. If you look at hatchery fish, I'm not knocking but in order to survive in a raceway you'd better eat the thing that the crew put in the water or you don't get it. In the wild you can't be that aggressive. You have to have feeding sites and territory and take your food without being eaten yourself. So they're more energy efficient in the wild. Hatchery fish have no, by definition, they have to do that they don't mind people they don't mind crowds, they don't worry about cover that's not an issue with them. It's to eat. And eat fast. So you get a creature like that who has no territorial demands and you put them in the wild where there are territorial demands, that upsets the wild fish. They expect this size to act this way. They have a pecking order of feeding, the smaller you are you get the lesser spots. Hatcheries have no rules. They could care less about those rules.

INTERVIEWER: What do you think the wild fish were doing?
VINCENT: They were moving and when you move you die. Movement isn't good because they don't know their territory anymore, they have no feeding sites. We did tagging studies that showed when you stocked O'Dell the fish would move in great numbers and when we didn't stock, they did not. You were disrupting the whole social structure of the wild fish and that was what was causing the problems. So much disruption that they couldn't handle it. Death ensued. But it didn't bother small fish cause they don't have territories in the same realm that the big fish had. They were just picking up what they could on the edges. The stocking didn't hurt young fish. We had good recruitment but we could never get them in to be big fish, we'd lose them. You'd have these big year classes that never materialized. Then everything readjusted. It started readjusting rapidly. By the time the third year came along, rainbow increased 1000 percent in the Madison and brown trout doubled. We did three years of testing. We had a hitch in the middle; nothing ever goes like it's supposed to. In the first year, no one ever admitted to it, but it was stocked right in the middle of our study section. But they stocked it.

INTERVIEWER: Was it intentional? Was it like bucket biology?
VINCENT: A truck backed up, three miles from the federal hatchery. They didn't want the study done.

INTERVIEWER: The Feds didn't?
VINCENT: No one ever admitted to it but they magically got in there and when we electrofished they were all in there. They backed a truck up and dumped them in. But it didn't hurt the study because the population dropped once they did it. You can't fix that stuff. It actually enhanced it because it built two years and it went boom. They quit and it went back up. The study was designed so you couldn't mess it up. O'Dell Creek population went in half. These were big browns, 2 or 3 pounds that disappeared. We lost everything. It went way down. It responded, when we quit stocking, it came right back. We were stocking rainbow against browns, it hurts brown trout. Not as bad as rainbow against rainbow. I think its social disruption.

INTERVIEWER: Did the hatchery realize what they had done?
VINCENT: They didn't care. In fact, I knew the head guy up there and he hated me. I understood because I was threatening him and his work. He wrote an article in Outdoor Life a number of years before that, when I was in high school, that he was the man who saved the Madison River by stocking it. And I came along later and said what you actually did was wrong. I guess I understood that. So, a number of years after that I met him one time somewhere. And he said you were right. You were right. I thought that's cool. I didn't want to be right or wrong. I just wanted to find out an answer. We were doing a scientific study and we got the results. Hatchery people thought I didn't like them, but it's wasn't personal. We were doing studies. The hatcheries will be here forever because there are other places.

INTERVIEWER: Do the hatcheries still stock the high mountain lakes?
VINCENT: Yes, at that time all the energy and money was going into catchables and now they could cut the catchables off the budget and do things that were productive like lakes that didn't have reproduction. It was readjustment of what they did. But it was personal and it never ended. It always hung around me for the rest of my career. I am sorry about that part but you do what you have to do. The data says what it says. I believed the data. It wasn't biased. And some of it surprised me at times. And also what came out of that whole thing, it got settled, and they had a gentleman's agreement for years that they wouldn't dewater it. And they held up to it. Finally it got incorporated into FERC (the Federal Energy Regulatory Commission). They now have to do it. They did it by gentlemen's agreement and that's how the flows on the Madison got stabilized, based off of two lousy years of data and I'm embarrassed that it was that. I wouldn't want to hang my hat on that kind of data very often but it was two years more than anyone else had.

INTERVIEWER: But you had to use the data you had.
VINCENT: I was amazed they believed me but they did. That's how the whole study came about. I've heard all kinds of versions of how it happened from I was being pressured by some outfitters to get out of there. Everyone wants to take kudos, ha, ha. There were people taking kudos who weren't even there. The key people who had to own up to it and had their reputation on the line was Bud Gaffney, Leroy Ellig, he was a strong support of all this, he was supervisor in Bozeman. He was one of the nicest guys I ever met. And of course, Art. Art could have

killed it any time he wanted to and we'd had far less headaches than I created for him. But he wasn't that kind of person.

INTERVIEWER: He wanted the science and he wanted you to do it.
VINCENT: He wanted the science and it was right. He said it was an appropriate study to do. But I couldn't believe it when the commission asked him to put his job on the line and he said no.

INTERVIEWER: So you did the study for three years.
VINCENT: Yes, the pre- was '67 to '69, and the post- was '70 to '74. And then we had the big meeting in Ennis to decide what the state was going to do with all this data.

INTERVIEWER: Was that when you took it back to the Commission?
VINCENT: Yes, the meeting was in Ennis. It was an interesting meeting.

INTERVIEWER: Good for them, they went right to the place where it was happening.
VINCENT: They went way further than I thought they would. They made it for the whole state. They said no stocking in any stream where there are wild trout.

INTERVIEWER: Why do you think they included the entire state?
VINCENT: It was the data. It was compelling data. It wasn't just the Madison. We did other experiments -- the Gallatin River doubled the population. It wasn't part of the study but later on all these streams benefitted from it.

INTERVIEWER: They knew if it happened in these few streams, it could happen all over the state.
VINCENT: Yes, and we went wild trout in 1974.
INTERVIEWER: Is that when all these magazine and newspaper articles started talking about wild trout management and Montana.
VINCENT: Montana became different; we were the only state who did it. Some states had no stocking on some streams, but this state went every stream, period.

[End of Recording #2, 2/23/18]

[Beginning of Recording #3, 2/23/18]
INTERVIEWER: When we paused, we were discussing that the Commission finally saw what the implications were with not stocking any rivers.
VINCENT: Yes, they saw it was expensive and it did more harm than good. It came down to a couple things. Fishermen thought that if you have one fish in the river and you add another fish, you have two. But it turned out that if you add one plus one is less than one. That was the concept that you just add fish on top of what you had. Nature didn't like that idea at all. It actually was a negative impact. All your habitat work and flow work and fishing limits meant nothing because if you had better habitat so what? It didn't give you more fish. Better flows didn't give you more fish. This had to be taken out of the formula early on. You can't be doing something that makes it worse and saying that if we do this it will be better when you do all of it, it still isn't better. It was an important step in wild trout management to get rid of that. It was nice not to have to spend money and not get positive results. One of the things I noticed afterwards, that after we quit the stocking it was wild trout period and you'd better make it or break it with good habitat and flows regulation become more important now. People recognized that. It wasn't unlimited. We couldn't buy more.

INTERVIEWER: We have limited resources.
VINCENT: Right, it was limited and we had to protect our water. People who never paid attention to flows, if they moved the river a little bit they were screaming, and now they were concerned with things they should have been concerned with. More flows. Now the power companies locked into not doing something because the public said they didn't like it; before they couldn't care less. The remedy was to stock more. It's too easy to spend other people's money to make your fishing better. It didn't actually make it better. The other thing that stocking did is that it reduced the size of fish in the creel. If the fish are put in at 10 inches… the life span of hatchery fish was maxed out at three months, maybe four. They can't live in that world.

INTERVIEWER: The hatchery would raise all these fish to 10 inches and the data showed you they were gone in three months?

VINCENT: They thought they were living. Who knew what they were doing if you never sampled it. The hatchery fish are easily identifiable. They have no fins left. Once you raise them in close quarters like that, they don't regrow them back, they are gone forever. We knew how many were put in, and we'd do an estimate in September and then another estimate next spring before the next stocking season started. And you'd have maybe two percent left, maybe. Four or five fish left that you could call hatchery fish. We knew by creel census that at most they were taking 20 percent of all we put in there. The other 78 percent were dying. The reason was what I said earlier. They don't know how to live in the wild, they have no concept. They evolved under a different scenario. I had a fish biologist once who said why don't you give those fish a chance in the wild. And I said you can't. They don't know what to do. That fish had to figure out everything and if you did anything wrong, nature takes them out. So by the time it got to be two pounds he'd run a gauntlet of things not to do. We don't know what those are and can't recreate it. If we could recreate it we couldn't afford to. You'd have to raise them in a scenario much like what you are putting them into. And the best you'd hope for is to break even. So why would you even consider that an option? The only time stocking becomes a viable option is when there's no reproduction. Then you weren't hurting anything. That's a different world but that world had to change too. Domestic strain has a tendency not to live long either. Two years is about the most in lakes. The year you put them in, next year the fishermen get them, they're gone. You have a fishery based off how good they survive that first year. And if you had a bad take, the next when you'd fish them, they're not there. You're basin on two year classes. In the wild you're basing your fishery on six year classes. They'll live up to about eight years. In the wild you can't have a two-pound hatchery fish unless you plant one and you can't do that. Economically impossible. Fishermen complained there weren't any big fish left. One of the complaints I heard when I started. I didn't know what was supposed to be there. There was no data that said we should have a certain size. It kind of ruined fishing for me, knowing what's in there, it's not as fun as not knowing. Ha, ha. I know what you're going to catch, how big you're going to catch, it ruins it. Part of fishing is not knowing.

INTERVIEWER: Did you have to go to exotic places, Atlantic Salmon, steelhead?

VINCENT: I did some different fishing but it's a small price to pay. It kind of ruins it and you go, well I know what's in there. I always wondered all those years I fished, there's got to be some of this and that. And there weren't.

INTERVIEWER: Ha, ha. You can't fool yourself. You know what's in there. You were so knowledgeable.
VINCENT: Yes, there are some penalties for knowing too much. It was more fun when you had no idea what was out there. Could be most anything. It made anticipation worthwhile.

INTERVIEWER: Oh dear, took away your motivation to fish. Ha, ha.
VINCENT: It did mess with my recreation but there are other things to do. Those were trying times for me. Fish and Game caused divorces. Because the nature of the job, gone all the time. I'd leave Monday morning and come back Friday night. And for someone who is newly married, that isn't good. I understood. I was only married three years and then I found the wife of the century.

INTERVIEWER: Good, the love of your life.
VINCENT: Yes, we've been married 44 years and I adopted her kids.
[End of Recording #3, 2/23/18]

[Beginning of Recording #1, 4/25/18]
INTERVIEWER: This is Margie Peterson. Today is Wednesday, April 25th, 2018. We are continuing the oral history interview with Dick Vincent at R3 headquarters in Bozeman. So, Dick in the last interview you were telling us that you had found the wife of the century. Could you tell us her name and the name of your children?
VINCENT: Yes. I met Twyla in 1973 and we got married in the fall of '74. There are three boys, all hers, I adopted them. The oldest is Gary, the middle one is Bob and the youngest is Curtis.

INTERVIEWER: And what do they do now?

VINCENT: Gary is a truck driver, the oldest one. The middle one is semi-retired. He worked at the Big Sky Carvers in Manhattan. Curtis is a civil engineer. He works in Canada for an environmental consulting firm. They do reclamation on oil field work and anything else, mining, whatever comes up.

INTERVIEWER: Okay, so we were going to back up a little bit, when we were talking about electrofishing. You were going to talk more about the fish scales and that part of the project.
VINCENT: Yes, when I was hired, this is a minor recap; I was hired to develop electrofishing techniques and gear to sample fish on large rivers. There was a systemic methodology to quantify fish populations. But a third part of my job was the state had a scale mounting lab, the fish scale was John Peters job and I took over that lab. That lab mounted fish scales in plastic so biologists could age the fish. The aging process is essentially like tree rings in a vague way. Each year the fish grows during the summer and stop during the winter and the lines thicken. Next spring when they start growing again the scale grows more rapidly again and the same process occurs next winter. So you can count what we saw annually each year and determine its age. It's fairly accurate. We did some back checking on it to see, we'd mark fish in the wild and then recapture two or three years later to see how accurate we were. It was about 80 percent accurate. It wasn't a hundred, but nothing is a hundred. Fish can do a couple of things: one – they can erode the scales and erode off the outer age group so they age younger than they really are. If they go through a lot of stress with spawning and such they will sometimes lose scale size but then they regrow it back. Sometimes the fish scale will fall off and the new one will not replace the old record, it starts over new. So there'd be a big blank spot in the center. So over the years, I ran the lab so the biologists would send them into the lab. We had a lady hired and that's all she did.

INTERVIEWER: Do you remember her name?
VINCENT: Edith Jackson. And Eunice Nelson. And her husband Perry was a fish biologist, retired now. We probably did 100,000 scales a year.

INTERVIEWER: And it was here in Region 3?

VINCENT: Yes, on campus. In the old President's residence building. They converted it, Ken Greer took the lower part and the fish took the upper part, a small building. Then that was torn down and the new Region 3 building was built, we moved it in here. Over the years, I told somebody lately, I suppose I have aged half a million fish! In 25 years! A lot! While I'm not an expert, I probably did more than most people do.

INTERVIEWER: What did you do with the studies and what you found?
VINCENT: You can incorporate it into your estimate. Say for example you estimated 2,000 rainbow/mile or 2,000 brown trout/mile in a particular section of stream, then you wanted to know what sizes. This many over seven or this many over 15. But on top of that the more important piece was how many per age group. In other words, we could do an age structure, so many one year olds, so many two year olds, so many three. And that became important because often when populations had trouble it wasn't with a particular age group. In the early '70s on the Madison with the flow study, it was the young fish that dewatering impacted more than the old. With stocking it was the reverse. It altered or impacted fish over 2 so you could have lots of little fish in the stream, number wise it'd be very high, but by the time you got 2, 3, 4 and 5, you could see mortality rates in excess of 90 percent in a year. And we got the mortality rates by using age structure. For example, you estimated 700 2-year olds in the spring, in the fall we estimated 500. The same next spring was 3 year olds to see when the mortality was occurring, summer or winter. That became important because we would then associate that with whatever structure we felt was out there. In the case of flows it was a winter thing and in the case of stocking it was a summer thing. In the case of fishing it's a summer thing.

INTERVIEWER: Was there degradation of habitat as well?
VINCENT: That tends to be universal year-round. Once it happens it doesn't really… but you could tell what habitat was being lost, if habitat for big fish or habitat for small fish. It's different. So age structure allowed you to look at it. If you look at just total numbers you can get so confused and so meaningless. Because you can have 10,000 fish in a mile, 9,500 of them yearlings, that's not a good fishery. Or you can have a fishery where there's very few young and the fish that are there are older. So if you found recoupment was poor then you looked for issues that could be impacting that, or vice versa. If it was a big fish, high mortality then you could

look at… for example, overfishing, the stocking thing, some are thermal problems, different issues.

INTERVIEWER: So before you realized that Montana Power had to regulate the flows, when they took the water down at certain times, could that have caused problems too?
VINCENT: Particularly on young brown trout and the reason they were bothered more than young rainbow trout, young brown trout are shore fish, their habitat is along the edges. So when you dewater obviously you pull water from the bank and you make small fish compete with big fish and it doesn't work out well. Rainbow are more dispersed, they're pretty much everywhere, so they aren't tied to shoreline. So their impact with dewatering would be different than large fish. If you had a stream where pulling back the water destroyed large fish habitat then the large fish would be impacted. The age structure was vital in deciding where your problems lie. Particularly with fishing because fishing is never an issue with fish that are under seven inches. No one will ever keep those. Or catch them. What we found, and I'm going ahead, but for an example, if a population is full of young fish but very low numbers of adults. So you go, okay, something is going here. Then you had to identify when the loss was occurring. That would give you the next clue where to jump.

INTERVIEWER: Are they still doing the scales today?
VINCENT: I think it's gone by the wayside for the most part. I think you lose a lot of information that way but it's time consuming and it's an annoying thing to have to scale fish all the time. Initially we had a lab microscope that would blow up the size cause we didn't have fish readers or any of those things. Recently I talked about it in the northwest. They're now putting them on film. They're taking pictures of them. Like a CD. Then you put it in your computer and you go to photoshop and you read them off that. And trust me, that is so much easier than what we had to do. You can change the light intensity or make them sharper. They did a little experiment, FWP, on that. They knew the age of the fish and they sent four of us, I was already retired, I thought it sounded fun. So I read them and I think three other people read them, different degrees of experience. I found it easier to read if you could look at a screen and you weren't sitting in the dark. I was around 80 to 85 percent accurate. You aren't going to get much better than that. You need to know things about the stream to read them right. I want to

know when they took the scale because if they took them in the spring it's different than the summer or fall. And where you count the numbers. And I need to know growth checks. A good example is the lower Madison. They'll grow really well and then it gets too warm by mid-summer it's past the growth and they'll put a check down which means they stop growing. Then they restart and it's a false check. You need to know that ahead of time, which stream has that issue. It could be a spawning check, there's a multitude of things that happen.

INTERVIEWER: A check is when they stop?
VINCENT: Stop growing. You need to know that ahead of time, if that occurred there. All of that takes time and it's a pain in the neck for a lot of people. You got reports and people calling and you have to have alone time to do this. You can sit and concentrate to do these things. The new biologists, their lives are so busy, and it's a different world, they can't spend that kind of time. They're forced to move on.

INTERVIEWER: I suppose the size helps them.
VINCENT: Yes, but in a stress environment, you always can't count from this size down is this age. Growth rate changes with stress. Whatever the stress can be, it can be a multitude of things. You can't count on doing age structure past one if you just look at the data. It would be a rare scenario. Or slow growing fish, a two-year old can be the same size as a four. They hit a certain size in that habitat with that food supply and water temperature some doesn't allow very fast growth. You can't really tell is that's just a young population of small fish, or an old population. If you need to know scales are about the only way. If you don't have time to know, or need to know then you don't do scales. I think the world has evolved that they don't have time to do that.

INTERVIEWER: It is unfortunate that so much of this new technology has taken a bit out of the time we have to do all our work.
VINCENT: The new biologist lives in a world I didn't have to deal with. The amount of real biology you do is less now too. It's not their fault. It's time constraints. The product becomes not as good through no fault of theirs.

INTERVIEWER: That's why these oral histories are so meaningful because we have the stories down about how you did your work.
VINCENT: I recognize it's a new world. I'm from a world of data. If you have data behind you, you can do a lot of things you can't do when you are guessing. The whole stocking studies would not have occurred without data. Who is going to believe "I think it's lower." Opinions based on no data are just that. You can be biased, what you see today doesn't mean anything.

INTERVIEWER: I know… I was looking over the transcript from last time where you said, just because you caught it today, doesn't mean anything. Ha, ha.
VINCENT: Yes, I've had anglers tell me it's good and bad three days apart. And I go, well, it didn't change that fast. Ha, ha.

INTERVIEWER: Thank you for that explanation of the aging process. We did need to get that down. Do you want to move into the Harrison Reservoir and the DeSmet strain?
VINCENT: Yes, we finished the wild trout stocking studies in '74. I was trying to see on Harrison Reservoir similar scenarios. We had stocked with catchables since '55. And using old spawning trap records. I went in in 1976, in the spring, to see how many rainbow were actually going up the small tributary, Willow Creek, and spawning. So I blocked it; as fish went through I tagged them and we got seven.

INTERVIEWER: And this is the one near Three Forks.
VINCENT: Yes. Three Forks, just east of Harrison. On the Jefferson drainage. I knew there weren't many gillnet studies on the lake, they're hard to interpret. We looked at that and the numbers were no big fish. People were complaining how poor the fishing was and we were stocking it with catchables, and sub-catchables, both. Nothing good was happening. Decent angler size. And our gillnetting data suggested. First there were no wild fish left in the lake. Whatever was there was locally stocked. To give you some background data, I knew it could be better than that. If you looked in the '40s and '50s, the state used that same site to trap spawning runs to take eggs to take to the hatcheries to grow fish they could stock. The record keeping was kind of different than I would do. They just measured some fish and counted the rest. But the runs would be several thousand adult fish and these fish averaged over three pounds. They

didn't measure everyone. So there were several thousand fairly large rainbow spawning there on an annual basis. About 1954-55-56 the philosophy for stocking changed in the state. Prior to then, they'd take the fish, size like Harrison and would hatch them out in May and stock them again in the summer as fry, four or five inches long, that was as big as they could grow them. That wasn't producing much in a lot of places. The thought was the bigger the fish the longer it would survive in the wild when you stocked it. There was some truth to that. On a national basis and statewide basis, hatcheries started to hold a broodstock. But you needed a fish that would spawn in the fall and the reason for that was that you take eggs in September you have all winter to grow those and you can put them out in the next June, they're going to be eight, nine, ten inches long and could be a catchable. If you take the wild eggs there isn't enough time, you'd have to hold them for fourteen months. Just economics said that's not a good idea. You could hold them seven months if you changed the spawning time. So what they did, they kept selecting for fall spawners and just got earlier and earlier spawners until they backed it to the September period. There's some real heavy risks to doing that genetically. That's not the fish you started with. They were able to accept these broodstocks, there were three or four different name, Arlee's and some other names they had for them.

INTERVIEWER: Was it Arlee because one of the hatcheries was in Arlee?
VINCENT: Yes, that's where the broodstock were held. They just picked that name for this particular strain of fish. So from '55 to '56 on, they transitioned it to where they would put catchables in there. In their own records, prior to 1958, the spawning run went from several thousand to a handful. And by the time I looked at it twenty years after that there were, like I mentioned, seven. So I asked around, could I stop adding catchables and find a wild rainbow somewhere. We needed a spring spawn. That search was difficult.

INTERVIEWER: Were you looking outside the state?
VINCENT: We had to, there was nothing here. Nothing I could put my finger on that we could use. I looked at two different strains, finally. One was Eagle Lake out of California, which was semi-domesticated. The other was the DeSmet rainbow which is Lake DeSmet, Wyoming. And that fish was wild. They had a spawning trap like Harrison did prior to '55 and they'd use the fish to raise whatever and we ordered in 1977 the first round of fry. The eggs went to Bridger

Hatchery or Lewistown I can't remember which one. They hatched them out and then we stocked them in the spring about where our fish trap was or above. Imprinted them at two and three inch fish. We did that in '77, '78, we couldn't get fish in '79, and then '80 and '81 and we finished. So we had four imprints over a five-year period. Then we set the trap back up. By the time, I think 1983 we had run over 2,000 fish coming in there, large fish. There were some problems with the early fish because in Wyoming they took the spawn at a different time period than would be ideal. They spawned later in Wyoming than they would have in Willow Creek. They took the eggs in late May, and by late May here we have floods and you can't run the trap. When we put them in the fish had to readjust. So the ones that spawned early set up the new year class system. So it took about four or five years but from 1977 on no more catchables were put in that lake. We went cold turkey. Went with wild fry. For years it was very successful. The population for a small lake, this is only about a 400-acre lake, it's not a very big place. We had anywhere from 2,000 to 3,000 they would average from two to three pounds each, they were big fish. That still persists. That population is still going on. Occasionally we'd have to supplement imprint back in the stream because the stream is heavily dewatered for agricultural uses, it almost dries it up. During some water years you're not going to have good recruitment. But the fish is basically wild by this time. And it became our source for wild rainbow in the state. And later on when we get to whirling it turned out to be a real bonus. Fifty percent were immune to whirling disease, they were highly resistant to infection. To no understanding of ours, I don't know why they would be. And we don't know where they came from [before they were in DeSmet, Wyoming.] The whole history on it when I was searching it out, I wanted to know where they originally came from, California or some coastal state. But no one knew, I asked people who should know. I talked to hatcheries in California. They said they just bounce around to different tributaries and pick up rainbow. Who knows where they came from.

INTERVIEWER: So if they did that, then possibly some of what they got had some resistance.
VINCENT: Yes. They just consider a rainbow's a rainbow. It's a fish. They brought them in on a train in milk cans in 1895 from somewhere in California, unknown origin. And put them in DeSmet. I'm sure they put them elsewhere too but that's the place where they… they don't stock it so what's in there is wild. Wyoming does strange things. Just before whirling, the DeSmet rainbow have a different behavior than Eagle Lake which is the other wild stream.

They're harder to catch. Their feeding habits are different and they are more of a wet fly type rainbow whereas the Eagle Lake you can catch on lures. They wouldn't allow the DeSmet to run, they blocked it, and I think that's a major mistake. Why would you destroy a viable wild population. My philosophy with fisherman is, you figure it out, how to catch them. It's not our job to get stupid fish out, that's your job to figure out to catch them. They will figure it out.

INTERVIEWER: I know we'll talk about this in the whirling disease, but what's interesting is that fifty percent had an immunity and didn't catch the same type of infection, they must have come from a different environment.
VINCENT: Yes, some environment with a similar parasite. They had to have figured it out. There's several similar parasites, some native to the west coast. It's hard to tell exactly where they came from or what instigated that but when I get into that, we had an interesting experiment occur and out of the whirling disease study this was the most interesting piece of data and it may have saved the Madison River from whirling. Most people don't even know why, including biologists. It's hard to prove. It's nice for me I can say it. I'm pretty sure. Ha, ha.

INTERVIEWER: Yes, with your knowledge, you know it back and forth. So did the Harrison Reservoir point you in the direction of special regs, were there special regs before that?
VINCENT: No, oh about the same time. About '75, Ron Marcoux moved from Missoula, he was a biologist, to the fish manager in Bozeman, '75 or '76. We'd already finished the wild trout studies but there were issues in the upper river with overfishing. From the Madison Bridge, there's an upper 35 miles from there to Quake Lake. It's a long ripple. The fishing pressure was pretty intense even at that time. We were wondering, while the fish numbers were great, I think I estimated about 4,000 rainbow a mile, most of them were under ten inches. That's what I mentioned earlier, you can have the numbers and the total pounds of fish might not be that bad, it's just rearranged in a form that anglers aren't crazy about. We did some survey work asking people what they wanted and they wanted more fish over a pound which is over 13 inches. If you looked at the actual population data, we might have, as an example, 5,000 yearlings a mile which are under seven and the rest of the population is 500 a mile. So they represented ninety some percent of the population and that was true of brown trout. Which suggested highly that they were overharvesting it. So we started some fish population work in '76, '77, and we set up

two sections from the upper river. One called Pine Butte which was above the west fork and the second one was below the west fork which was Snowball. Initially we were just looking at numbers, age structure, mortality rates. An interesting thing we found, and that's when the standard regulations at that time was a ten fish limit. We did some creel census, we did some spring and fall estimates to see where the mortality was occurring… to give you a good example, the mortality rate during the summer period if you looked at fish one year in the spring to one year in the fall it should be one plus fish, it was about thirty percent lost during summer. That's fairly normal, thirty, thirty five percent lost. But with large fish, two and older, ten inches and bigger, or nine inches and bigger, the mortality rate in the summer was eighty-five percent, and that's too much. The population can't deal with that kind of mortality rate. Then we looked at the over winter mortalities from December to April and it was like five to ten percent lost. In other words there'd been so many die in the summer they don't need to die in the winter. So we said the mortalities are all shifted to the summer with fish older than two and larger than ten inches. And what's causing it. So then we took the experiment… we had a couple of data years, so I went to Ron and said let's try this. I remember walking in the coffee room in the older building and Leroy Ellig was there, the regional supervisor and Ron, I said can I close a section to all fishing? No fishing allowed? Of the Madison. They looked at me like I was nuts. And it was like the same concept with stocking/no stocking. I said here's why. If we can take the Pine Butte section which was under ten fish limit and we'll change that to catch and release. Never had been catch and release in Montana.

INTERVIEWER: Oh my goodness, you pioneered everything.

VINCENT: Whether that was good or bad I don't know. So I came up with numbers and they said you have to let them keep something. And I said well the data suggests with the amount of fisherman, we have too many. I knew what catch rates were from the creel census. You can have one and a quarter fish per fisherman, anything more than that was too many. If they all kept them and we had to make the assumption they would which I knew they wouldn't but if they did, one is all I could give them. Then we went to the Commission meeting and they said okay, we want to go from ten to… and I gave them numbers, none, one and two or three. I said three you might not even bother it's the same as it is now. So they said let's just go zero, total catch and release.

INTERVIEWER: And how long did they give you to try this?
VINCENT: It turned out that we did that for six years.

INTERVIEWER: Six years that section of the Madison was closed?
VINCENT: Yes, and I said we need to close the other one so no fishing can occur. So I can compare a ten fish limit versus no fish limit versus catch and release, no fishing at all. There were arguments that catch and release had some impacts. There is. We went in there with that concept and I figured the one I'm going to lose on is no fishing. To close six miles, actually it was ten miles to the river, I needed a buffer, I would be lynched. The study section was four and a half miles so I needed a buffer. I think the boundary stretched maybe it was six total miles. I buffered each end, so you just didn't stop right there. I went with that and we did the same estimates. Then we would go in and look. We'd creel census, we'd close one, we'd have one catch and release and compare to the old numbers where we had ten fish. Interesting enough as we progressed through it, Ron's a politician, a good talker and he knows how to go about that with the Commission and we got it through. They weren't happy with it and the deal was struck initially is that if this doesn't work, even after three years, we would revert back. In other words if catch and release wasn't helping they didn't want it there.

INTERVIEWER: So they were giving you three years.
VINCENT: The three years was the catch and release part. The closure was six years for other reasons. They said okay it's a trial basis and on top of that we did a similar one on the West Gallatin, but I'll finish this first. So it was not permanent, it was a temporary study period much like stocking was. We had three years and see what we could find. Interesting enough if you compared mortality rates to the catching rates versus ten fish prior to that, summer mortality rates were eight, eighty-five percent with ten fish. Once when catch and release it went to thirty-five percent. So we saved forty-five percent. But the winter mortality started jacking up. There were more fish than it could carry so the winter it went back down. But it was still a plus. The numbers of large fish just skyrocketed, from 500 a mile two and older, it went to about 2,000. But the small fish started to decline because you can have so much space and room and you can have lots of little ones and a few big ones or more big ones and less small ones. It kept the

system going. Then we compared that to no fishing at all. That was an interesting comparison. As I mentioned summer rates with ten fish was eighty, eighty-five percent, with catch and release was around thirty, might have been forty-five percent. With no fishing it was twenty. Then the winter rate was higher. The mortalities were the same if you go annually there was no fishing in the two. So if you go from spring all the way back to spring, catch and release on rainbow and catch and release on brown trout was the same as no fishing. But the catcher was that brown trout had a different, the mortality rate in the summer on brown trout was only twenty percent with catch and release compared to twenty percent with no fishing. So the elevated mortality with rainbow trout in the catch and release was release mortality. Anything above the twenty percent was release. So we figured twenty-five percent of fish that really died. But it was a livable mortality, in other words, the winter was going to scrape them off anyway. So as long as that mortality rate didn't exceed that, catch and release was going to work. But if it exceeded that then it won't work. Say if the summer losses were another fifteen percent release mortality, you're going to lose your population. I assumed that. And Fred Nelson did a study, cause they argued that okay it's the hook type that's causing the mortality. And he could find no difference between barbless and barbed, trebles or single hooks. The hook itself wasn't causing mortality. What we surmised was it was how long you played them. If you were playing them in warm water when it was summer time and you play them too long, they might look alive but they aren't going to make it, you exhaust them. Rainbow are highly active. Brown trout are not. So they aren't seeing any measurable losses in the summer. So release mortality in brown trout was nil. Or not measurable. So it was the rainbow we had to focus on. And we noticed with electrofishing, if you electrofish when it's too warm and they're so hyper that they burn themselves out even in the fish tanks and you'll lose them. They stress out. So we can't shock above a certain temperature. And probably fishing is not much different than that. The colder the water the less release mortality. Giving what I know about rainbow, these "hoot owl" regs they do now are probably more important with rainbow than brown trout. But rainbow and maybe with cuts, I haven't worked too much with those. You shouldn't be catching and releasing anything rainbow-wise above 65 degrees F. So I think that's where the mortality was. And the game on fly fishing is, the finer the tipet, the longer you can play them the more fun it is. There's some risk to the fish like that. Some education of quicker release is probably important.

It's probably not important cause there's enough mortality in the winter that you aren't going to gain anything by saving them in the summer. But there could come a day when that's important.

INTERVIEWER: What did the sportsmen's groups say when you were doing all this?
VINCENT: All the fly fishing, Trout Unlimited loved the catch and release concept. They'd been after us ten years before that to do it.

INTERVIEWER: The more fish the more people we can float down the river.
VINCENT: Yes, but if you are damaging it, it makes sense that you spread out the fish among more people. While I went into it not liking catch and release as a fisherman myself, because I grew up in the era when you caught fish, I didn't release everybody, but I kept some.

INTERVIEWER: Sure, I know you've heard this, we used to say while camping, catch the fish in the river and turn around the put them in the frying pan.
VINCENT: They're good that way. Ha, ha. The longer you keep them in the freezer, the poorer the taste is. Contrary to my background but the data saved them. And that's what you have to go with.

INTERVIEWER: So catch and release caught on and the Commission..
VINCENT: Yes, it spread to other waters. We did another one and we did it in the West Gallatin River. We found a population of a lot of small fish. Turns out they were small old fish. They don't grow as fast up in the canyon where the water is colder. So we went in with the same concept only we used a slot limit which is a modified catch and release. You can't keep fish between certain sizes, under and over you can. With the same agreement, three years. If it didn't improve it we'd be out. It didn't improve it so we were out. Got rid of the regulation. That wasn't the issue there, it was slow growth. There's no way to grow a two pound fish in there. You couldn't live that long. For example a five-year-old fish in the Madison would weigh about 18". A five-year-old fish in the West Gallatin is probably 12". Life span is 7". The West Gallatin in the canyon to the Park, past Big Sky. That water is much colder up there. Lots of fish. There were over 3,000 fish a mile. But they weren't going to get big. So there was no need for that type of regulation.

INTERVIEWER: How long do rainbows usually live?
INCENT: Seven or eight is the life for trout, and they weren't going to live that long there to get that big. So we bailed on that one. Similar experiments in other places, and I assume the same philosophy occurred. So that's where catch and release special regulations started. It worked for that and it worked for populations where they're catchable. The slower growth rate may not give you big fish. There's probably no way to give you big fish other than the occasional one that figures out something different to eat. A young fish that's stunted might be ten inches but you might find one fish that figured something out different to eat and got very large. But they're rare.

INTERVIEWER: So if somebody catches that one, they might think they're all kinds of fish like that. Ha, ha.
VINCENT: Just an odd ball eating behavior. They may have gone to sculpins or some small fish, something like that to get bigger. They adapted but that's rare. The whole population can't afford that, you run out of food source. We look at total pounds of fish or total biomass, it doesn't change that. It rearranges sizes and that's all it does. For example, on the Madison you probably have the same pounds of fish per mile with a ten fish limit but they are mostly young with a catch and release regulation total pounds of fish would actually be the same. If you look at numbers, you actually have more fish per mile without catch and release but you can't focus on fish per mile because if they're all between five and seven that doesn't make an angler very happy. And there's another thing that you can't measure… what you do to a population genetically when you take all the large fish out, forcing the small fish to spawn that may not deserve to spawn. In my mind the fish has to reach a certain age and size to prove it's a survivor and their progeny then is stronger than, or as strong as they are. If you revert to fish that are a year and a half old, it changes the genetics of that population. I think it's appropriate to have a nice mixture of ages and sizes, that's hard to prove. You can theorize but it makes sense.

INTERVIEWER: Well, that seems to be evolution, the weaker strains…
VINCENT: Yes, you have to prove you can make it to live. And if you take, well one fish lays 2,000 eggs, of those two of them are destined to be spawners. If you start going to smaller fish,

some of them shouldn't be doing that. Only those who have figured out how to get from an egg to three years old should be spawning. And the rest shouldn't be. In a normal population, small fish don't participate. We found that as the number of older fish increases, the spawning age increases. If a population has been hit hard and all the large fish are taken off, younger and younger fish mature just as a way for nature to make sure something makes it. We found that in Willow Creek that fish when the population have a low density they spawn younger. With a higher density they spawn older which means that you're leaving the spawning to the older more survivable fish. I figured as a bonus having a nice age structure hose that deserve to spawn got to. Nature has ways of working that out. Another interesting thing that doesn't have much to do with any of this, we noticed that much like the rest of the world females live much longer than males. They're more important to the population because one female has 2,000 eggs, one male can fertilize probably four or five, six female. So they're less important. And they don't live as long. They recycle much quicker. When we start catching and keeping abnormal amounts of large fish there's another thing we disrupt. It's just healthy to not deviate too much from nature. It worked for a long time without our help. Our job is not to interfere with how nature worked it out and still have our fishing recreation. I think we can have all those things. You can't just let people take a boatload of fish. I remember when limits were fifteen and they were probably higher at one time, it's not healthy.

INTERVIEWER: Yes, I remember photos from Yellowstone Park from the early days with just strings and strings of fish.

VINCENT: I know from my childhood Dad finally said quit bringing fish home, turn them loose. So I did catch and release for other reasons. He said we have enough fish to eat, we don't need more. They're better fresh than frozen. So I practiced it for other reasons. I told my kids too, if you aren't going to eat it, put it back. It may not help the fishery but… I had a grandson fishing and we were fishing one of those little spawning runs off Hauser Reservoir I guess and the fish all pooled around where they were stocked. He caught one and said do I keep it? And I said do you want to eat it and he said no. So I said turn it back. He doesn't like to eat fish.

[End of Recording #1, 4/25/2018]

[Beginning of Recording #1, 5/2/2018]

INTERVIEWER: This is Margie Peterson. Today is Wednesday, May 2, 2018 and I am continuing the interview with Dick Vincent at Region 3 headquarters in Bozeman. So Dick, you wanted to talk about some of the electrofishing training you did with some other states.
VINCENT: Right. It was real interesting since Montana primarily was the front runner of all the states as far as doing population work on larger streams and using electrofishing as the capture method. It didn't take long after giving some talks that other states became interested in doing similar things. Early on we worked with Colorado, they sent their head biologist up and he spent a week with us. We went through how we did things, technique wise and information wise. Then Wyoming sent a crew up and we spent a week with them as well as Idaho. Interesting enough, I did three trips to Canada, Alberta invited me up and we went through some routine things. Then they set up a fish population, electrofishing safety workshop and they invited me up to be a co-instructor. Then each of their biologists and crew leaders had to pass a course in order to continue to do this type of work. I spent a week up there with an old friend from the university here who went to Canada to be a biologist –Mel Kraft. Then they certified everyone. It was a couple years later that I was invited to Kamloops, British Columbia. I helped teach that course. Part of their courses was electrofishing and water safety. At that time the state decided it would be a good additional duty for me, to conduct similar workshops within the state so all fisheries biologists who worked in water could have to pass this course. I did that up until the time I became fish manager in 1988. I finally decided, but reluctant to go from fish biologist to fish manager I did so in 1988. I much prefer research over management. I figured it was my turn.

INTERVIEWER: So the electrofishing with other states, was that in the early '80s?
VINCENT: Late '70s and early '80s about a ten year period.

INTERVIEWER: You talked about your uncle designing the boxes you used. Did you take them with you and show them how to use them?
VINCENT: Yes, early on we were trying to find some type of electrofishing boxes that would convert from AC to DC and my uncle had the electronic knowledge to do it. He didn't know what we were after and it was my job to tell him how to do it and what we wanted the end

product. He actually made them commercially for a while. I have no idea how many he sold but he sold to other states as well.

INTERVIEWER: So when you did the training you used that box?
VINCENT: Yes, and sometimes other states had their own boxes. There was a Coffelt box that was out, similar but not the same. Some states would use a Smith-Root box which is battery run but it didn't have the power we needed to do large streams. We went over the different gear they could use. The Fisher box, my uncle was Jim Fisher, and that was used by Montana and there might still be some units out there. Later on a professor at the university took over making my uncle's boxes. I think they made some agreement and my uncle would slide out.

INTERVIEWER: Nice. But that box was made with your specifications.
VINCENT: Yes, I told him what it needed, adjustable voltage. We came up with a combination, pulsing current which means the current goes from zero to peak voltage maybe sixty times a second and you can adjust it. There's some data suggesting that pulse current could reach out further than straight continuous DC would. It didn't require the power because you're only on half the time. The other time it was zero. There was information suggesting that might be an additional need out there. The machine was built to do straight DC, zero to peak, or zero to half voltage. You'd use whatever combination you wanted, that you felt would work best in your scenario. Probably the most use was straight. Before you plugged it in and took whatever the generator gave you which sometimes was too much. So you could dial it to your specifications. That was the primary electrofishing box used by the state.

INTERVIEWER: Sure, it worked better than anything before.
VINCENT: I got lucky, my uncle could build it and I could tell him what I wanted.

INTERVIEWER: Okay. You also mentioned about becoming the fish manager in Region 3 in Bozeman in 1988. And that leads us to the discovery of the whirling disease.
VINCENT: It was interesting; there was a period of time that the fish manager position was in flux. I had Brad Shepherd, Livingston biologist, take over some of the population estimates that needed to be done on the Madison River. We hadn't filled the position yet. About 1996 there

was a vacancy in that position and Brad was working in the river and came back to me with some data. He said there's no small fish in the river. And I said you must be doing something wrong. We always had young rainbow trout in the river. And he said, no, the population doesn't look good, we're not getting the numbers we used to. The population started to fall and we were uncertain about it. Mark Lere, the Madison biologist, took over that and between Mark and I, we looked at the data. There was something seriously wrong there.

INTERVIEWER: And this was in 1996?
VINCENT: Yes, when we first noticed. No actually it was 1994, I'm sorry. There was limited reproduction. It started to work its way down. We had study sections near Quake Lake, Pine Butte and Snowball was lower and Varney was the lowest section on the river above Ennis and it started to do the same thing. But it didn't do it on the same year. It was sequential. Whatever the problem was, it was coming from the top.

INTERVIEWER: Pine Butte is where?
VINCENT: Pine Butte is where the West Fork of the Madison comes in. It was a mystery what was going on. We just did not understand what was happening. I had a good friend in Colorado, their top biologist, Barry Nehring. He was working with whirling disease a few years earlier. The symptoms were similar, you lose the small fish cause that's what whirling disease attacks. Fish from zero to three months of age. Right after they come out of the redds, after they hatch, the whirling disease parasite hits them and the mortality rate can be severe under the right conditions. They had already seen the signs of this. So I talked to them on the phone and told them it looked similar to what they're seeing. Mark went out and electrofished a bunch of very small fish and they took them to the lab to do the histology on the heads. They looked and there were whirling parasites embedded in the heads. Whirling disease parasites food source is cartilage. And that's what young fish are. Very little bone. When the parasites hits in the head it causes brain malfunctions. It actually can occur on one side of the fish and that's what causes the whirling. The fish can move on one side but not the other so it can't go straight. It can't swim straight. Mortality rate is exceedingly high. Infection rate gets to a certain level. After I saw a couple years of data and Mark had shown me the population started plummeting on rainbow trout. Brown trout it didn't bother. They're immune to this parasite. The parasite

originates in Eurasia and brown trout have evolved with it so they know how to deal with it. They do get infected and it might get a few of them but it's not catastrophic. Rainbow had never seen it at least the rainbow we have and they couldn't deal with it.

INTERVIEWER: Did you have any idea where it came from at that time?
VINCENT: Yes, a pretty good idea. One of my crew members was electrofishing and they captured two exceedingly large hatchery fish by the West Fork. Those fish were stocked but not by the state.

INTERVIEWER: Yes, bucket biology.
VINCENT: There are people who bring things in. They brought them in from Idaho, large caravans of campers. And I'd heard stories that they brought in some fish and they'd dump them in where they camped so they could catch them the next day. They were large fish and they were stocked. We never got to test one. In the early '90s we found these fish and I don't have any idea how many they placed in the river but that's where the infection started. That was the first place we saw population issues. At the time we saw it we said where did this fish come from? But we didn't realize what it had. It takes a while to start, the fish have to die and release the spores and then they go through a couple of life cycles. That builds up numbers. By '94 it was impacting populations. It probably took three or four years to build up. You couldn't see it at first. Mark ended up seeing fish that whirled in the river. I went to Helena and met with Pat Graham and Larry Peterman in the Director's office. I told them there's a serious problem occurring in the Madison River and it won't be long before the anglers figure it out. Before the problem appears it looks good. The reason is anglers look at what they catch and not what the whole population looks like. In one of our earlier interviews I talked about knowing how many ones, twos, threes, fours are there. So in this particular damage, it comes from the bottom. There were very few young fish so every fish you catch is big fish and they're happy. Pretty soon everybody, if you don't recruit, there's nothing but large fish left. That's not good. Anytime a biologist should see a population with nothing but large fish, I worry. There's something wrong. That's not the way fishery works. Fishermen look at it differently and I understand that. They look at what they catch and not what's going on from the bottom. When I sat down with Pat and Larry to come up with a plan how to announce it to the public… this

wasn't going to go over well… saying the Madison river had some serious problems. Nothing was known about whirling, it was a dark hole, nationally or anywhere.

INTERVIEWER: I think I read where Colorado did not have any luck in controlling it, it went all over there state.
VINCENT: And they didn't recover. I have some theories why but that's ok. One of the problems was for us was how to tell the public?

INTERVIEWER: Were you going to close part of the river?
VINCENT: First we had to tell people what was going on. One thing I admired about Pat and Larry both is that we don't hide things, we tell them like it is. In the big picture that is better. You weren't going to hide it forever. You have to tell them what's going on. One of the problems in such a popular fishery is that people make money off this fishery. And they're going to be impacted. If we say things are getting bad, some businesses will get hurt. Pat was one of the best directors I worked with. He felt we needed to tell them and call it like it is. That was '94 that we decided to say something. After we brought it out, I ended up being the ambassador around the state. Even though I was the fish manager, I went to every town in Montana to talk about whirling and what the impacts may be. Kalispell, Missoula, Great Falls, Billings. Pretty soon I was probably neglecting my own manager's job because there wasn't time to do that and do my job as well. I was sitting at a commission meeting and Pat Graham told me to come to his office. I want to talk to you. I had no idea what he wanted. He said, he went to the Governor and we're going to create a new position, Whirling Disease Coordinator. Would you be interested? You need to think about it for a while and I said No. I will do it. It's more interesting than fish manager too.

INTERVIEWER: Sure, fish manager works a lot with HR and personnel and no research.
VINCENT: Yes, all the bad stuff and no good stuff. Not really in my nature, I don't like that kind of work. There's one other time that saved me. I was the regional supervisor, acting, for one full year. Al Elser asked me to do it. Bob Martinka went to Helena as administrator, so they left the job open and Al said it would just be a short while. But I did it for a year. I said I can't be fish manager and regional coordinator at the same time, you will have to hire someone. I

don't even like to do that job. To my good fortune, Martinka said we didn't pick you. I said you did me the greatest favor on the planet, I didn't want it.

INTERVIEWER: This was the coordinator job before the whirling disease.
VINCENT: Yes. I went back to fish manager and then became the whirling disease coordinator. Fate played that hand good for me.

INTERVIEWER: So, let's get back to whirling disease. You found it and told the public. You had public meetings all over the state?
VINCENT: Yes, I talked about it at all the meetings.

INTERVIEWER: You told the public that it could show up in their rivers too.
VINCENT: Yes, that was something we didn't know. When we started this, there was a friend of ours, my wife and I, Jenny Miles. She maintained the fishing access site at Harrison Lake, I was her boss. I went to her and we needed to have some way to test other waters. She had a place at Pony, up on Willow Creek. She had a garage and I said I'd like to set up a lab and we don't have mucho dollars. We set up a small lab in her garage. We got fry from the hatchery, then found a supplier of TAMS. TAMS are the infective form of the parasite that attacks fish. In the life cycle of whirling disease parasite, there are two live stages. One of them involves the fish, they infect the fish, the fish die and release the spores and then small Tubifex worms eat these spores in the process of their feeding and they generate the next parasite level which is what we call TAMS. They're released in the water and when the hit a fish they attack the fish and shoot another spore into the fish which then travels up the nervous system into the bony tissue. Then it infects the cartilage, the portion of the fish and it'll infect any cartilage but when it gets in the head it becomes lethal. We needed to test how hard or heavy the infection. There are moderate and heavy infections. We needed to be able to detect the infection. The lab at Pullman Washington could do that. They did all the work so we'd just send them fish heads. And that's how we started when Mark Lere collected them on the Madison. The Pullman lab did all the work and sent back their results. Beth McConnell from the Fish and Wildlife Service co-worked on all this. She was good at that world. So we came up with techniques to decide what level infection by how much cartilage was destroyed in the head. Level 1, 2, 3, 4. Once you got

up to 4 they probably weren't going to live. When you get to the real high levels, we figured that was when populations were going to be impacted. Level 1 wasn't causing serious problems. Then we set up a statewide system to sample all waters. I hired a crew that did just that. We got young fry rainbow from the hatcheries, we'd put them in live cages in the river and hold them x number of days in the stream. Take the fish into the lab at Pony and raise them until they were big enough to develop the disease. Then about ninety days the fish were killed and the heads were sent to the Pullman lab and they would tell us the level of infection. We used sample sizes of 50 or 60 fish.

INTERVIEWER: So you were using of course the young fish.
VINCENT: Early studies from other places showed that infection starts almost when the fish gets out of the redd after they hatch and it takes a while to generate the disease after they become infected. They are only infectable until the bone cartilage hardens and then the infection stops. That's when you send the fish off, about ninety days. There was a lot of interest in whirling because it involved Montana and Colorado initially. The two states who were hit the hardest. Being the Madison hit first, and being it was probably the number one trout stream in the United States, if not the world…

INTERVIEWER: And that was your river, ha, ha.
VINCENT: It was. The attention was quick. There was money issued by Congress to help fund it as well as the legislature funded portion of it. They funded my salary plus a technician plus some operational money.

INTERVIEWER: Well, I remember newspapers, magazine articles, radio, everyone was talking about whirling disease.
VINCENT: Yes, Beth and I were interviewed by national TV a bunch of times. We had no idea how bad it might get. Colorado experienced catastrophic losses. Even the Madison River, I estimated it killed ninety-eight percent of the fry in each section each year so you had two percent surviving which isn't enough to keep a population going. So it was limp along… the population just plummeted. There were naysayers and the whole gambit of people out there. We didn't know how it was going to be or how long it was going to be. And if it was going to jump

to other rivers. There were regulations enacted that you couldn't fish with anything that might spread it around like minnows. We banned sculpin fishing because maybe they could carry it. Well it turns out they can't but we didn't know that t the time. You have to overkill. It was a fine line to tell them every time a new river became infected… were you sensationalizing something that may never be bad or do you keep it a secret? The choice was to tell them. A lot of places never experienced catastrophic deaths, but we didn't understand why. Over a period from 1994 to the time I quit, there were huge amounts of studies done nationally. The federal money was put into a fund that MSU managed. We issued projects from it. Anyone who wanted to do anything that would help us out. From the very basic research to fish population work to whatever we might use to stop this. When you introduce a pathogen like this that's not native things don't go well. The best prevention is don't get it. But unfortunately that wasn't what happened. So most streams that could be infected were. Fortunately in Montana not all of it was bad. Montana has wild trout management and that's the key how to survive it. The genetics of how fish evolve and how they do with pathogens, if you're stocking to maintain it, you're fixed in time, there's no evolution. No acquired immunity. The hatchery fish are protected. That was the first thing we did was to make sure no hatchery became infected. Of course the fish that you restock are naïve to the parasite they have no idea how to deal with it. You haven't answered the problem. With the emphasis Montana had on wild trout, plus quality habitat, I think we were able to bypass some serious problems. I can give you some examples of what happened, of how the parasite may have partially won and didn't win. Take Rock Creek near Missoula. It was primarily rainbow with some brown trout. Now it's a brown trout stream. To my knowledge it never recovered. Rainbow are there but the numbers have never returned. It changed species. It was fortunate because brown trout can't take over every rainbow habitat. They're different fish. The thing with Rock Creek, it was mutual habitat so they could trade places. The Missouri River, that's the one that caught a lot of flak. Missouri below Holter. A beautiful wild trout stream, world class. We were fearful, there were some studies done prior to whirling, to find out where the young fish were coming from. They identified Prickly Pear Creek and the Dearborn River and some smaller streams that were the primary producers of fry. So the Missouri River rainbow came from tributaries. That was the premise. So our assumption was that if the tributaries become lethally infected the river would fold. Yes the tributaries did get lethally infected. We even purchased some fish traps that would record how many fry came out of a

particular tributary. I think the big one was Prickly Pear Creek. The number of fry coming in just plummeted. But the river didn't suffer. There are some interesting things… I talked to the new fish manager there who used to work with me and what they found is there's some reproduction in the river itself. The river itself never got whirling. It was not suitable for that parasite.

INTERVIEWER: Was it the temperature of the river?
VINCENT: Yes, temperature is the critical item. If the temperature is too warm. For example, to make it lethal, the TAMS when they merge and the fry merge at the same time, it doesn't go well with the fry. But if you can separate them in time, the TAMS come out and there's no fish to infect. The TAMS come out at a certain temperature, they don't come out every month of the year. They are temperature related. Thermally they have to be a certain temperature to come out of the Tubifex worm. After it hits the water, if its too warm, they don't do well. They don't form. Back to the Madison… So the lower Madison was too warm at the time when the worm needs to produce TAMS it can't. The upper river was infected but the lower one never became infected. The lower is below Ennis Dam. Ennis Dam alters the temperature structure of the river amazing amount, almost ten degrees warmer. It causes problems. There are times that we have fish kill lower river below Ennis. Trout fishery is always subject to thermal kill. The warm in this case protected the fish from the parasite. Kind of a fine line. Too warm for the parasite but okay for the trout. So the Missouri is below a dam as well and dams alter the temperature regime of a stream. Its enough that we could not identify significant production of TAMS in the river itself. We did a lot of live cages in the river in various places, up and down, and we couldn't identify the problem in the river with TAMS being produced. But tributaries which have a normal temperature regime become heavily infected. So I made the assumption that if the data said that all the fry came from tributaries was correct, we shouldn't have a fishery in the river. Fortunately, it didn't work that way. Fortunately nature said we have a backup plan. And it worked.

INTERVIEWER: So this is like Wolf Creek, Craig…
VINCENT: Yes, we made some assumptions and I gave talks that it would fold, but it didn't. I'm not unhappy about that at all. I may have been wrong and some people were upset. But you

don't have enough data. That's always an issue. There's never enough data. One thing I've learned working in biology, there's more exceptions than there are rules. I had a mathematician tell me once, an interesting sidebar, he said he'd never be a biologist. He said in math there are rules and we follow them. But in biology there are no rules.

INTERVIEWER: So the Missouri was doing pretty well. I'm guessing that…
VINCENT: We went through a period on the Madison River between '94 through 2000 that it wasn't doing well, rainbow wise. About 2005 and 2006 we started to see reproduction coming back. It took about eight to ten years. There were still fish coming in and it wasn't totally … but the population went from around 2,500 a mile to around 500 a mile. It didn't eliminate the fishery but it reduced it to whatever reproduction could dribble in and it could support. It looked grim year after year we didn't see young fish. To give you an example, a normal year class of yearling rainbow, when they're big enough to see, would be 3,000 to 4,000 per mile. During the rough periods, it'd be under 200 per mile. That's how bad it was. There were years you could barely find enough fish to make an estimate. It went through some pretty bleak years but we started to see some recovery and improvement and not really understanding why. We did some interesting work, I'm probably going to segway back to Willow Creek that we talked about earlier and Harrison Lake. We found fifty percent of fish were immune to the parasite. They were highly resistant. Fifty percent were not. Whatever that fish was, the DeSmet from Wyoming and where they got it no one knows, they had some latent immunities. They'd seen something similar to this in their long history and no one knows where or how they could have got that resistance. We tested more strains of rainbows than you can shake a stick at and none were resistant. We did hatchery strains, we did wild strains, the Colorado ones weren't. But Willow Creek got badly infected and since half of them were infected we did see a temporary drop in that population. It quickly recovered. I worked with a geneticist out of Utah and we did a study, we found that they just selected the ones that could survive. Pretty soon they were resistant. Towards the end, by 2006, 2007, 2008, they were pretty much resistant to the parasite.

INTERVIEWER: So they naturally became resistant.

VINCENT: Just by evolution. Those who weren't, died. Is this an aberration to Willow Creek or is it the DeSmets? Well, Wyoming destroyed the DeSmets so we couldn't ask them for more to test their DeSmets.

INTERVIEWER: Why did they destroy them?
VINCENT: They weren't as catchable as the strain they wanted in there. Eagle Lakes were more catchable. Fishermen talked them into switching strains. It was a thriving population. Who destroys a thriving population of rainbow trout because they're not as catchable? I would go to the fishermen, figure it out. When we brought DeSmets into Montana in '77 some of them were siphoned off to mountain lakes in the Beartooths. I knew they were in there. So we got special permission to fly in with a helicopter to pick up some of those fish, spawn them out and take the eggs. And brought them to the lab and they were fifty/fifty. All those years they'd been up there, 1977 to about 2005, they were on their own. They self-reproduced. And they were still fifty/fifty. So wherever they came from, the DeSmets. They could have had a population that was resistant and a population that wasn't and they just spawned them together. They just maintained it over the years. Some resistant, some not.

INTERVIEWER: So you took them from a lake in the Beartooths?
VINCENT: Yes, that we stocked with DeSmets. For some reason, they retained this resistance from some unknown source off the coast. No one knew where they came from, talked with people in California, on the coast. Most of those populations are extinct now. We'll never know why they got it, but they were resistant. They were in Harrison Lake. And we were using the Harrison Lake DeSmets to stock quite a number of lakes, Hebgen, Wade and Cliff Lakes. They had access to the Madison River. Not all fish that are put in the lakes stay in the lakes. Some move back out. Here's something I can't prove, but I believe the resistance in the Madison River came from those fish, the DeSmets. They were escaping out of the various lakes we stocked them in. We saw cutthroat and Yellowstone cutthroat in Hebgen Lake and we'd find them in the Madison. They just don't stay where you put them. Most of them did, but some don't. And they disappeared, they don't do well in the river and they were gone. They aren't native to the Madison. We knew they were escaping out of Hebgen; that was the head of the system. So we started to do some work with a baseline, how infected the Madison River strain was. We took

fish that we knew were old enough to be there prior to whirling and took eggs from them and tested them in the lab. We did artificial exposure in the lab to test which rainbow strains were resistant and which weren't. We couldn't find any except the DeSmets. So I had a baseline that found that one or two percent would be resistant, which is almost nothing. Everybody just got wiped out. We kept following this, we'd take a certain age fish, take eggs and follow them with time, so we could follow fish that were born in '90, '91, '92, '93, all the way up to 2005. I'd send a crew out and tell them to take eggs and keep them separate and I'll age the fish and we'll know when it was born. We tested them and started seeing increased resistance as we worked in time. It matched what we saw in the river with more reproduction surviving. By the time I retired in 2008 it was almost back to normal, year class strains. Our tests showed they were almost back, weren't totally resistant, but highly resistant. I wanted to do a study to determine and identify DeSmets genetically from the Madison River fish. The foundation, Whirling Disease foundation, came up with some money to do this. Unfortunately, the technology, even in 2008, wasn't there and they couldn't tell the difference between the DeSmet and the Madison River rainbow. They all looked the same genetically. They aren't but there wasn't enough genetic work to identify one fish from another. It would have been interesting to know how much DeSmet genes were involved in the Madison rainbow. I would bet my last dollar that's how they evolved because Madison River recovered by resistance. The Missouri didn't fall because of habitat protection.

INTERVIEWER: Sure, the temperature of the river.
VINCENT: Rock Creek survived by changing species. So those are ways of getting around it. If you can't do any one of those three things you don't make it. I think that's the boat Colorado was in, they stock catchables. They were trying to evolve around it by stocking and I don't think you get there from here.

INTERVIEWER: So, what about fishing pressure. It seems to me that if the sportsmen and fishing guides couldn't fish the Madison, did they all send up fishing the Missouri?
VINCENT: It dropped for a while on the Madison River. But they redirected to other streams that weren't impacted.

INTERVIEWER: That's what I wondered, if it caused any unforeseen pressure on some places.
VINCENT: Yes, I'm sure guides didn't do well, some restaurants. Some people believed we should shut up about it, they wanted people to come anyway. I understand that but it isn't the way you do business.

INTERVIEWER: So there wasn't any problem with fishing pressure on the good rivers.
VINCENT: No and the Madison didn't dip as far as you might think. They were still catching brown trout and the rainbows were not extinct, just very low numbers. It actually took it back to numbers when we stocked, almost the same levels, rainbow wise. Brown trout weren't infected so they didn't drop back. But 500 a mile seemed to be a maintainable number of two's and older. Even with that low recruitment. It wasn't devoid of fish, just a lot less than they were used to. Of course, there are people who wish you wouldn't say anything and just let it go. A person making money off the fishing can say it's just a bad day, or yesterday was great, or whatever you want to use. I appreciate what position they were in, it's their pocketbook. But we still believed the idea that Pat Graham and Larry Peterman and I thought, you have to inform the public. It may not be pleasant but it's honest.

INTERVIEWER: So what happened with the other rivers around the state, probably just in the western region.
VINCENT: Fortunately, habitat protected us in most cases, in those two modes, either too cold, too warm, enough spawning diversity, that was key. Another reason the Madison got hit so hard is because all the spawning occurred, not off stream, there's no tributaries spawning in the Madison, it's almost all mainstem spawning and located from Quake Lake down past the west fork, they're all concentrated in one area. If you take that away there's no other place to go get fish. Streams and rivers that have diversity of spawning, there's going to be some spawning areas that are either too cold, too warm, too something, or the timing's bad. Montana protected itself from whirling by being protective of all the habitats. And trying to maintain as many quality spawning tributaries as possible.

INTERVIEWER: Since had the best practices and management of our habitats and working with the power companies with waterflows, helped save us.

VINCENT: Yes, the Madison got saved by pure luck. There was nothing genius about any decisions we made, except I personally believe but can't prove that without DeSmets we would have a brown trout stream with some rainbow. They may have eventually evolved on their own but it would have taken longer. They were halfway there. If you're two percent there you will probably get there sooner or later. And I'll tell you some anecdotal stuff that I think is interesting. Some people who have fished that river pre-whirling and post-whirling have a different view of what's going on. I don't know if you know Dave Kumlein. He owned the tackle shop in Bozeman but he became the director of the Whirling Foundation and TU. He is a fisherman and a pretty good observer. What he told me is the way you fish the Madison rainbow pre-whirling and the way you fish it post-whirling are different. The pre-whirling rainbow were surface dry fly feeders. The post-whirling are wet fly fishers. They have different behavior patterns. They aren't the same fish that were there before for whatever reason. You have to change your technique. And it's not the dry fly fishing stream that it once was. They act more like the DeSmet rainbow than the Madison River rainbow. And they probably are. Whatever the river chose to be the best fit with whirling. If you try to stock it just doesn't work that way. You're fixed in time unfortunately because you protect the fish until you put them in and then you don't protect them any longer, well it isn't going to work. I honestly believe that we got really lucky that we had the DeSmets. The state sent fish to Utah and to Colorado to help because they're resistant and they're wild. There's a resistant hatchery strain out of Germany but they're just that. They are a long term hatchery and those fish weren't resistant when they took them over but they were there for probably hundreds of years so they became resistant but they're still fall spawning hatchery fish. You can't put those in the river. So you're caught between a rock and a hard spot, you have a resistant rainbow that doesn't know how to do it.

INTERVIEWER: Well, you did enough studies and got the baseline data, you knew what you were doing.

VINCENT: Even though the DeSmet were fifty/fifty evolved to about 95 percent and that's all been published. So I'm pretty sure, I just would have loved to have that last piece of information that the Madison River rainbow have genetically DeSmet genes in them. It's probably a moot point but I'd still like to know. An interesting concept because wild fish are remarkable if you leave them alone. You see, the only help we should give them is habitat. After that they can

handle it, long before we ever appeared. That's true with salmon too. If we leave them alone, or try to protect as much habitat as we can, I recognize the economic needs that aren't going to return it to 1700 -- it's not going to happen. But I think the program that's out there now is just like trying to stock the Madison and make it better. It isn't going to happen. But they are doing something and I don't think it will work. Nothing's working now. They are fading constantly in numbers. That's a big topic now. I get contacted almost two or three times a year for someone to want to do an interview who wants to see it go this way with salmon or steelhead. I believe that it will work it's just painful. I don't think we like painful cause it isn't going to cure itself tomorrow. The pain is somewhat economical where people are going to suffer and stocking does supplement some, just that I think it's wrong to spend lots of millions of dollars to something that isn't going to work.

INTERVIEWER: So back to whirling, with the fishing groups wanting you to not go public and you not knowing how long it would take, that must have been troublesome.
VINCENT: When we first had whirling thrust on us nobody knew anything. Zero. It's hard to start from zero and try to make predictions. I remember at a meeting, someone asked how long it would take to recover. And I said I have no idea, ten years or a million. I didn't know at the beginning. You can guess.

INTERVIEWER: It's interesting that you have discovered the three options that the fish can do to recover themselves.
VINCENT: In each case either the infection didn't get to a lethal point, or in the case of the Madison, that's the only river to my knowledge that's ever been infected that bad and recovered. Ever. Anywhere. Luck plays some role in it. Ha. Let nature figure out some things. If we had tried to cross fish would we have picked the right one. And nature goes, yes, no. It's terminal if you're wrong. But it worked to our benefit. Lots of cases didn't get severe because we're so diverse on the spawning. But in the case of the Missouri if it wasn't so diverse it wouldn't have made it. Cudos to diversity! And the same is true in the case of Rock Creek, we had a fish that didn't care if there was whirling. And if you want rainbow back it's considered a failure, but it's not coming. Over time there's always a few fish that are resistant and over time it may evolve

back to rainbow but in the interim you have a nice brown trout fishery. It worked. So that's what I've learned these ten years of it. We had no idea when we started what to do.

INTERVIEWER: So you retired as the whirling disease coordinate, 42 years with the department. From electrofishing, to fish scale and aging and growth and whirling disease, you've had quite a career.
VINCENT: I loved it. I wouldn't change a thing. I knew what I didn't want to do in life.

INTERVIEWER: Can you think of anything that we didn't cover?
VINCENT: No, we got it. And as I told you in the beginning, the Madison River has always been a part of my life and I'm glad I could work on it. I couldn't have asked for a better life.

INTERVIEWER: Well, this is the completion of your oral history and I appreciate all the time you've taken to do this. Your stories are wonderful and very important to how great Montana fisheries are today. And important for others to read and to learn from. I am honored to work on this with you and to transcribe the recordings. Thanks, Dick.
[End of Recording #1, 5/2/2018]

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ORAL HISTORY