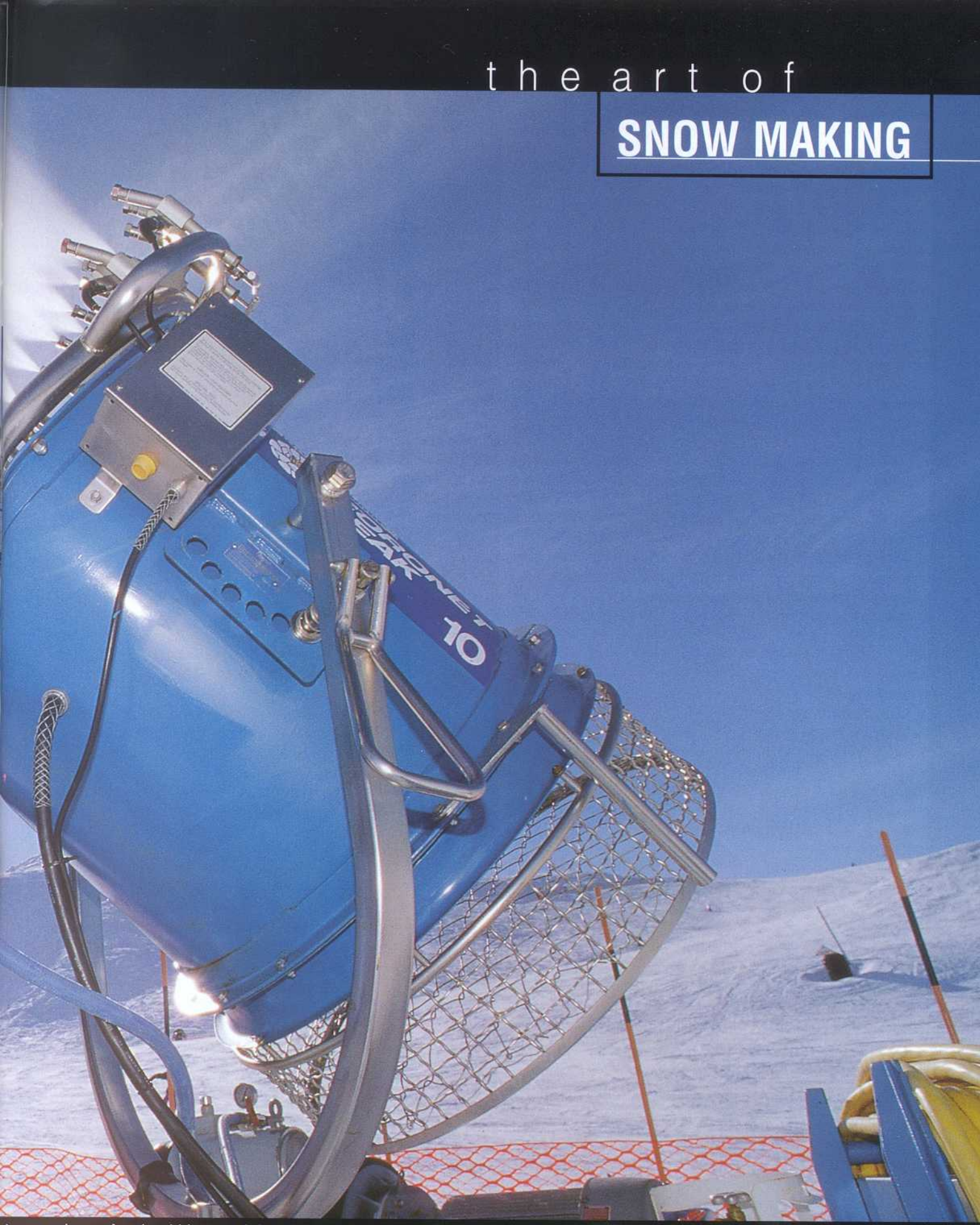
the frosty boys

Can skifields insure against no snow? They can, they do, it's very expensive, and

the art of
SNOW MAKING



t works. And, like a blessed oxymoron, it doesn't involve insurance companies.

STORY AND PHOTOS BY ROB GREENAWAY

The story begins with a few people in white coats talking to orchardists in Iowa (otherwise famous for being a four letter, three syllable word). Unlike skiers, orchardists don't like things to freeze— frosts are bad for fruit. So our engineers are poking around food crops wondering if there's a way to stop the water on fruit from going hard. One day they're in a cornfield. It's a bit brisk, the temperature is just a few degrees below zero. One observant researcher (probably a student who never gets any credit) notices that although the ground isn't frozen, the ears of corn are. "Bingo", they cry. "That doesn't make any sense at all".

Back in the lab, our student gets the job of putting 50 ears of corn through a centrifuge and seeing what's there. "Lo", he cries, peering through the microscope. "It's Pseudomonas syringae, and I do believe the bacteria's unique shape is making water freeze at high temperatures."

Fortunately the first orchardist they told this information to was not upset. Although all her fruit was covered in this naturally occurring bacteria and was doomed by the incoming frost, she was a skier and snowboarder. Having recently lost great chunks of plastic off her favourite snowboard by hitting rocks in some thin and gnarly snow, she knew the perfect application for our friendly Pseudomonas.

"It'll be like insurance for snow," she cried (very quietly), as she bought the small company and its patent, dumped her soggy frosted peaches and went on to be a very well-dressed boarder, unrecognisable in the crowd.

The story isn't quite accurate. For example, the concept of snowmaking has been around for a while—since the mid-1960s in fact. However Pseudomonas is a bit more recent, and makes the whole game of making snow a lot more interesting. More importantly it reduces the risk of running a snowfield.

The concept of making snow sounds pretty straight forward—blow some water in the air on a cold night, let it freeze and fall to the ground as very small pieces of ice. In essence—snow.

Sorry—not that simple. According to Des Peters of Ski Industries in Christchurch, you just can't blow any old water into the air and expect it to freeze for you. Des imports a whole range of skifield equipment - including snowmakers and Pseudomonas - so he's hot on cold water.

"If I took a glass of absolutely pure water I could lower its temperature to minus 40 degrees and it would still be a liquid," says Des.

And did you know that minus 40 is the same in Celsius and Fahrenheit? Des does, and now so do you.

"Now, if I dropped a hair in that glass it would snap freeze immediately. Water, you see, needs something to trigger freezing— what we call a nucleator. Any old crud might do, but even so you aren't going to get water freezing if you blow it through a snowmaking machine at temperatures higher than minus 7°C. With Snomax mixed in at about one part per four million—so diluted it's undetectable—you'll have it freezing at minus 2.8°C, and that means a lot more snow."

'Snomax' is what Pseudomonas syringae gets dressed as when it's very dead, marketed and ready to fly and get frozen. This is not free advertising for Snomax. It just so happens that it is the only product of its type—there's no competition.

If the skifield is the artist's palette, a snowmachine the paint brush, Snomax and water the paint, then a snowmaker has to be an artist. At least if you go along with the analogy—or spend a day with North American snow makers (and seekers of perpetual winter), Drew Santos and Kevin Kreton at Coronet Peak.

The Mount Cook Group has invested heavily in snow making on the Peak with 42 snow guns (worth about $44,000 each), a collection of compressors, electrics and pipes, and a

Dodging a snow gun

Kevin Kreton checking the gun

65 million litre water storage facility, adding up to a $4.5 million asset.

According to Kevin, this "snow insurance" comes with a cast iron guarantee.

"Before the guns were installed at Coronet in '91, our season ran from mid-July to mid-September," he enthuses. "Now we're running for about 140 days a year from early June all the way to mid-October."

There's something about people who work on ski fields. I did a story for Skiing NZ last year on The Remarkables ski area and decided all the staff must have gone to the Amway school of work training, considering their rampant enthusiasm—but also that it had to be a freak occurrence. But no, I've decided it's pandemic.

"Come with us," cried Drew, as he leapt on his snowboard, nursing his ruptured anterior cruciate ligament. "We'll show you how it works."

The first stop was one of the water storage facilities, lined with high tensile polyethylene (HTPE to you) and with air bubbles floating to the surface to keep it from freezing. Third stop actually—I was deliberately checking how good artificial snow performs as a cleaner for the inside of sunglasses.

"And don't call it artificial snow," sighed Drew, resting his three slipped disks. "It's real snow. There's nothing artificial about it. It's not polystyrene. Call it man-made."

I don't, because that's just not PC enough.

"How about "machine made"?

That's good.

Second stop, the pump house. This is where things start to look expensive. Big pipes, lots of tools, computer screens, wires—that sort of thing. A very large vat of Snomax and water sat in the corner (with very little Snomax inside - about 0.000025%). Drew started with the technical stuff, twiddling his keyboard, bringing up

Drew Santos making snow

satellite pictures of weather patterns and local readings for temperature, humidity and the preferred screen saver for the week.

"Humidity is as important as temperature," he began, "We could make snow at 1.5°C if the humidity was below 15%. If humidity is 100%, we couldn't do anything unless it was below minus 3°C. The computer lets us know where we're at."

According to Kevin, the technical nature of today's skis and snowboards has created a need for a very sophisticated approach to snow management. Boarders require softer snow since they have only the one edge, for example. Also, the reliability factor is so much more significant now with more people skiing, but often for shorter periods—a weekend here, a weekend there. Gone are the days of happily sitting out a few miserable days in the club ski hut. A team of 20 snow makers working 12 hour shifts throughout the season are required to keep the snow reliable. And they must all understand the art of using a snow gun: stop number three.

At Coronet the system relies on a pressurised water reticulation system (about 900 PSI for the techos) feeding Snomax and water to each of the 42 guns on the field. The noise the machines make is the sound of this compressed water being atomised by spray jets encircling a fair sized fan, which blasts the mist into what should be a low humidity and reasonably low temperature atmosphere. The result— snow? Not just any snow, but just the right type of snow.

With the machine running, Kevin slid under the falling debris and watched what should have been snow "bounce" off his goretex-covered arm. In this case the bounce was not good. The atomised water wasn't freezing and so stuck to his arm when it fell.

"Bounce" was the first really unique techo term I'd heard that day, and I assumed there'd be more special words in a snow maker's vocabulary.

"Bounce is a pretty key factor", explained Drew, once the snow maker was turned off and we could all hear again. "If it doesn't bounce off your arm just right then it hasn't frozen enough."

And more old words in new places: "There's a 'whale'. That's a pile of new snow that hasn't had time to 'cure' before being groomed". Like any good dictionary Drew needed to explain each new word with another new word.

"Curing. Now there's a bit behind that word. When we make new snow, it freezes a bit like an egg, with a core of water protected by a frozen shell. If it's "wet" uncured snow you can squeeze water out of it in your hand. So the stuff has to cure for two or three days—to freeze all the way through—before you should groom it. If you don't cure it right you can end up with a leaching whale - when water runs out from your pile of snow. When it's done right this type of "wet" snow makes a good base and that's what we make at the beginning of the season. Later on we make lighter snow—like silk— by using higher pressure on the water system and a finer mist."

"Natural new snow is about 20% moisture," Drew continued. "Machine made stuff is about 50% water, which is basically the same as five day old natural snow—once all the little arms have broken off the crystals and it's consolidated a bit. Like five day old snow, it's best—fantastic even—when it's groomed. So we've got a three-way system going—nature, snow makers and snow groomers."

"What we like to see is a four or five inch (see, they're from North America) layer of talcum-like powder on a durable base. When that happens we're happy."

Most of the snow makers learn the trade on the job. Apparently you can spot the rookies since they are constantly checking their bounce and are therefore caked in snow—if they're any good, otherwise they're dripping wet. According to Drew it gets intuitive after a while, which means it must be an art.

I continued my structured testing of the machine made snow. Run one; it doesn't clean the inside of your sunglasses. No patent opportunities there. Run two; it tastes like ordinary snow. Run three; once it's down your neck, it melts just like a popsicle.

Not bad to ski on too. Well, at least it's there.