

Appendix. Norm Christensen's (2009) 10 standard Rx fire orders from his plenary address at the 2008 Yellowstone Fire Conference.

1. *Know what it is you are trying to accomplish and why.* It is not sufficient to say that we are restoring fire itself. While fire is essential in many ecosystems, it is not the endpoint of management. Rather we manage fire—suppress it, restore it, and prescribe it—in order to conserve key things such as fuel conditions, natural and historic objects and wildlife, and key processes such as energy flows and element cycles. Our goals must be formulated in terms of these measures of forest sustainability.
2. *Set realistic goals.* We manage—we set fires, extinguish fires, and in various ways manage fuels—across a range of fire regimes. The fact that certain things are easy to do at one end of that range too often leads to hubris regarding what can be accomplished elsewhere. Prescribed fire is virtually an oxymoron in many fuels; forest restoration treatments of the kind that diminish wildfire risk in semiarid ponderosa pine stands are neither feasible nor effective in many other forest types.
3. *Manage the cycle—meaning the entire process of change—not just the fire.* Fire is just one moment, albeit a transformational moment, in a process of change. And, the nature of a fire, any fire, is determined only in part by conditions—weather, fuel moisture, etc. —unique to that moment. Much of fire behavior is a consequence of a century or more of ecosystem change preceding it. Furthermore, its behavior will influence the patterns of change that proceed from it over the decades and centuries that follow.
4. *Manage less for desired future condition and more for desired future change.* This order follows from the previous one. Change is constant and, as we have learned in several recent foreign conflicts, efforts to restore a particular condition with no thought about the change that will follow are likely to produce unhappy consequences. Across many parts of the West, we have embarked on a process of forest restoration to produce fire resistant structures. But, without a plan and the resources to manage that change that will inevitably follow this restoration, we will very soon return to high fire risk conditions.
5. *Variation and complexity matter—conserve them!* Perhaps the greatest ecological lesson of the 1988 Yellowstone fires was their remarkable variability and the equally remarkable diversity of recovery patterns and biological communities they produced. We now know for certain that the diversity of so many special places is a consequence not just of disturbance, but of variations in disturbance and the processes of change that they produce. For this reason, managers should avoid homogeneity in their practices.
6. *Eschew arbitrary boundaries—which means almost all boundaries.* This is, of course, a basic tenet of ecosystem management. The 1988 Yellowstone fires and other subsequent fire events have brought home the fact that the spatial extent of fire and of the many processes that are affected by fire have little relationship to boundaries of jurisdiction or ownership, or to the boundaries that we use to define social and cultural categories such as urban and wildland. This is particularly important where the scale of fire or any other process approaches or exceeds the scale of ownerships and jurisdictions.

7. *The world is changing—expect surprise and manage to accommodate it.* In its 2007 reports, the Nobel Laureate Intergovernmental Panel on Climate Change pleaded with world governments to take steps to mitigate greenhouse gas emissions and thereby slow global warming. Nevertheless, they warned that some warming and associated climate change is inevitable and that environmental managers should take steps to adapt to that inevitable change. Forests and related ecosystems must be a priority for such adaptation. Diversity and complexity provide a critical buffer for change. The loss of complexity and resilience in many of our forests is a matter of great concern, not just with respect to fire, but with regard to a great many natural and human-caused disturbances.
8. *Pay attention to history—but not too much attention.* The concept of historic range of variation has been a powerful addition to our understanding of fire in forests. But, the fire cycle is a very simplistic model of real-world change. Henry Chandler Cowles' wonderful depiction of succession as "change converging on change" is much closer to the truth. Yellowstone and other similar events have taught us that each disturbance cycle is different. This is an especially important lesson in our rapidly changing world. Changing climate may well redefine both the nature of future fires and the nature of the ecosystems they produce. Diminished air and water quality and the redistribution of species across Earth's surface are producing ecosystem change that has no historical precedent. I will repeat something that I said at the first biennial Yellowstone Fire Conference 18 years ago: Naturalness, defined as that that was before people mucked things up... naturalness is to ecosystem management as the frictionless plane or an ideal gas is to physics.
9. *Remember, you are mostly managing people.* There are so many aspects of this order that I could discuss, but I want to focus on the tenth fire fighting order—manage fire aggressively, providing for safety first. Fire management is not an academic matter; it has great consequences for human life and property. If nothing else has been learned on this matter in the past 20 years, it is that attempts to manage fire and fuels at landscape scales and across jurisdictional boundaries must have the engagement of all communities and stakeholders. The history of past forest use and perceptions about the actual intentions of forest managers—lock it up or log it—will be an inevitable subtext for community-based management.
10. *You only think you know what you're doing—be humble, manage adaptively.* This tenth order is, I think, an especially apt capstone to a week in which we have rehearsed in detail the wealth of new data and understanding that has come from experience and research in Yellowstone and elsewhere. We have no choice but to learn on the job—adaptive management is critical. We must ensure that our monitoring is directly relevant to goals and objectives (Order one), and that research is addressing our most pressing uncertainties. The world is changing, but uncertainty is an unacceptable excuse for inaction. Indeed, in a world of change, there is no such thing as inaction.