Summary and Synthesis: Cumulative Impacts[1]

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Although the title of our plenary session speaks generally of "development", virtually all of our discussion (and that in the other two plenary sessions) dealt with the effect of forest practices. That emphasis is appropriate. Seventy percent of the State's utilizable streamflow comes from commercial forest lands. An additional 25 percent of the State's water comes from--often intermingled--brush, grass, and alpine lands. It is not surprising, therefore, that concerns about cumulative impacts concerns also focus on forested lands, and specifically upon activities relating to the harvesting of timber.

There are at least four separate aspects to the concern over cumulative watershed effects (CWE's). The eight papers in our session did an excellent job of highlighting those aspects and the problems and conflicts related to them. The four aspects, as we see them, are (1) the philosophical basis or rationale for the concern over cumulative impacts, (2) the legal requirements which resulted from legislation addressing CWE's, (3) the procedures which have been developed by the responsible government agencies to address CWE's, and (4) the theoretical or empiric basis for CWE's and various mitigative responses.

Coats sees the history of the current cumulative effects controversy as a chronicle of the forestry profession's fall from grace. Foresters, he claims, have abandoned their historic concern with watershed protection and adopted a more narrow professional identity focused primarily on timber production. We see an alternative reading of the chronicle. We see it as a history of a turf battle between geologists and foresters, and between their respective bureaucracies. In the late 19th century foresters found it comfortable and expedient to wear the white hat of environmental protectors. Geologists were, at that time, mainly the handmaidens of the extractive industries of mining and petroleum. Presumably, their hats were black. Both sides were making unreasonable claims. The Forest Service was claiming that large regional floods could be attributed to poor forest management and the chief of the U.S. Geological Survey was claiming that "what man does with forests will have little effect on erosion."

Following World War II, forestry education and the focus of Forest Service management shifted more to timber production. Coats faults foresters for this. Although his criticism may be justified, in California, the Board of Registration of Geologists and Geophysists has recently taken the Board of Forestry to task for wanting to require Registered Professional Foresters (RPFs) to address geologic concerns. This still smacks of a turf battle to us. Regardless of which of these two different readings of history is more accurate, Coats is quite correct in his contention that the leadership in dealing with problems of watershed protection has shifted from foresters to geologists.

Coats accuses foresters of "timber fundamentalism." We see an opposing "earth-first fundamentalism," which is reluctant to accept any environmental degradation in order to acquire the benefits of forest products. Until these two fundamentalisms are reconciled, and the problem of cumulative watershed effects is approached more scientifically, we see little hope of resolution of the current controversy.

Viewed very broadly, a concern over CWE's seems quite prudent. A watershed-disturbing activity ought not to be undertaken as though it were the only activity occurring in a drainage basin. A prudent land manager should be expected to attempt to appraise how a proposed activity might interact with the present status of a watershed and with changes which might reasonably be expected to occur in the future. This very rational expectation that there be prudent management of natural resources becomes somewhat ambiguous when addressing CWE's. Neither the record of legislative deliberations, the subsequent laws, nor the resulting regulations

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give any clue as to the mechanisms that were expected to be operating or how dealing with them might be different, in any way, from mitigating individual effects. This has left land managers and regulatory agencies in something of a quandary. They are unsure of just what type of performance is expected of them. Perhaps, it has also led interested segments of the general public to expect more environmental protection than forest managers can reasonably achieve.

Four pieces of legislation govern the implementation of concerns over CWE's in the State of California. On the Federal side, there is the National Environmental Policy Act (NEPA) and the Water Pollution Control Act of 1972 (often called PL 92-500). These are the acts to which National Forest managers must respond. The Department of Forestry (CDF) and managers of private land in the State of California must adhere to the California Environmental Quality Act (CEQA), which is an analog of NEPA, and the Z'berg-Nejedly Forest Practice Act of 1973 (FPA).

PL 95-200 is the driving force behind the concerns being addressed by most of the speakers at this conference. It requires the control of nonpoint source pollution and specifically identifies "silviculture" as one of the activities likely to produce such pollution. NEPA and CEQA require the development of Environmental Impact Statements (EISs) describing the environmental effect of planned projects (a timber harvest plan is the "functional equivalent" of an EIS on private land in California). As Ted Cobb pointed out, the requirements for addressing cumulative effects can appear to be quite simple. They consist of determining (1) whether there are any circumstances that would make the environmental effects of a proposed project worse than would have otherwise been the case; (2) whether the possible effects are significant; and, (3) if significant, whether they can be mitigated. None of the laws require superhuman effort. In fact, they state that responses may be limited to what is reasonable, feasible, or practicable. The laws state that cumulative impacts must be considered. They do not require that consideration conform to any particular mode of analysis. They do require, however, that the nature of the analysis be described and the basis for a particular decision be identified. Court cases suggest that it is expected that decisions will be supported by empirical evidence or scientific theory. Several of the speakers noted that, so far, court challenges relating to cumulative effects have focused on procedural matters: were the points just mentioned adequately addressed? Thus far, no challenges have addressed the scientific justification for procedurally correct decisions. Many of us are concerned that once challenges on procedural grounds are no longer effective, the scientific defensibility of those procedures will become the target of law suits. The recent challenge of the Beetle-Dee sale on the Shasta Trinity National Forest may be the first such challenge.

The Forest Service and the Department of Forestry are the two agencies that have had to develop procedures for dealing with CWE's. Their procedures differ considerably because of the different nature of the two agencies' responsibilities. Neither has been tested in court. Consequently, the robustness of either procedure is in doubt at this time.-It is our understanding, however, that the Water Quality Control Board prefers the Forest Service approach, which is a form of timber harvest scheduling.

The Department of Forestry has shied away from that approach--in part because of the problems that. implementation would present in watersheds of mixed ownership. Instead, the CDF requires the RPF preparing a timber harvest plan to respond to 14 questions related to cumulative effects. Eight of those questions are related directly or indirectly to CWE's. This procedure has both strengths and weaknesses. The strength of the procedure is that it provides the RPF with an outline for the preparation of as thorough a treatment of CWE's as he deems necessary. Its weakness is that the checklist may engender a perfunctory response on the part of the RPF which will later be deemed to be unreasonably superficial.

The procedures currently in use on the Shasta-Trinity National Forest (as described by Mr. Haskins) are typical of those used on National Forests throughout California. We doubt that they will ever be accused of being perfunctory. We do fear, however, that they foster a mechanistic approach to the problem. As pointed out by Harr and Grant, the problem is not simple or uniform from watershed to watershed. We perceive that Forest Service procedures provide more flexibility than attributed to them by Harr and Grant. Nonetheless, we think that it is dangerous to use a single index, however complex its derivation, as a surrogate for all possible cumulative watershed effects.

Harr identified a central issue concerning management of CWE's when he said that it was a misconception to believe that "simplicity can be willed on the forest hydrologic system." This attitude is symptomatic of some forest managers. While proclaiming their expertise and insisting that deference be given to their judgments, they turn to researchers and ask for simple solutions to their complex problems.

Another important issue is whether we are dealing with additive or synergistic effects. Addressing CWE's through timber harvest scheduling makes the most sense if the effects are synergistic. There is, however, very little research support for synergism. Furthermore, the definition of cumulative impact in the NEPA regulations uses the word added. In their study of the Redwood Creek basin, Weaver and others found the adverse effects of land use to be additive, even in that extremely impacted watershed. A lack of synergism does not mean

that cumulative watershed effects do not occur, but it does make them less likely and, presumably, less severe. Ice gave an additional justification for timber harvest scheduling by saying that it "can be used to separate accidents or operational performance falldowns from accumulating to cause a cumulative effect." However, we agree with several of the authors who contended that the most effective way to deal with cumulative effects is to mitigate individual on-site effects.

Ice and Grant each present methodologies for dealing with possible cumulative effects. Their methodologies are soundly based on existing knowledge about hydrologic processes. Both procedures seem to us to be eminently defensible, technically and legally. There may be other hydrologic processes about which too little is known to develop a sound way of dealing with them. As Cobb has pointed out, the courts do not require that you engage in sheer speculation, only that you explain why you can't come up with an answer, if that is the case.

The papers in our session discussed CWE's from a number of perspectives. Certainly, there was no unanimity of opinion among the speakers. There are, however, some propositions on which we believe most authors could agree. They are as follows: (1) cumulative watershed effects should be taken seriously, if only to respond to the legal requirements for their consideration; (2) there may be real cumulative watershed effects that are not adequately addressed by merely implementing on-site best management practices; (3) timber harvest scheduling is a weak and simplistic way of addressing CWE's; (4) the most effective way to deal with most CWE's is by vigorous application of on-site Best Management Practices; and (5) ways of dealing with off-site cumulative watershed effects should be based on the individual physical processes involved.